FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

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AUGUST 25, 1960
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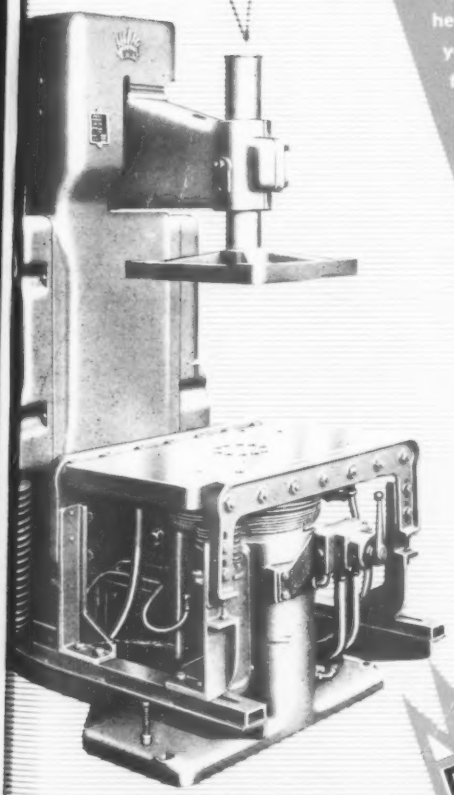

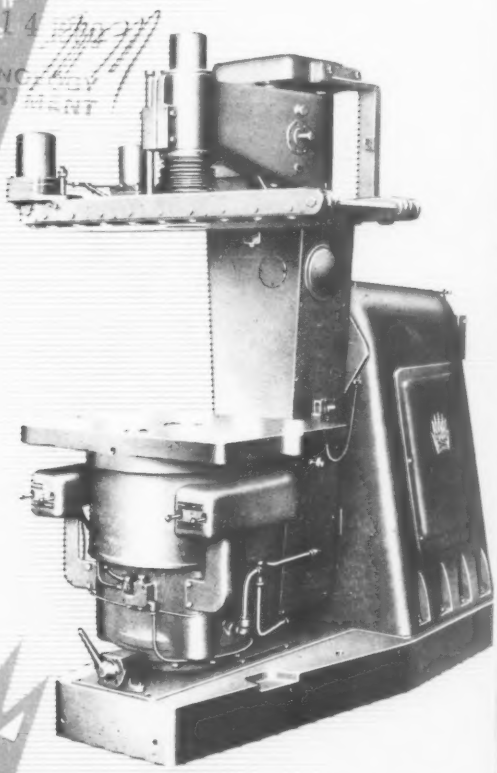

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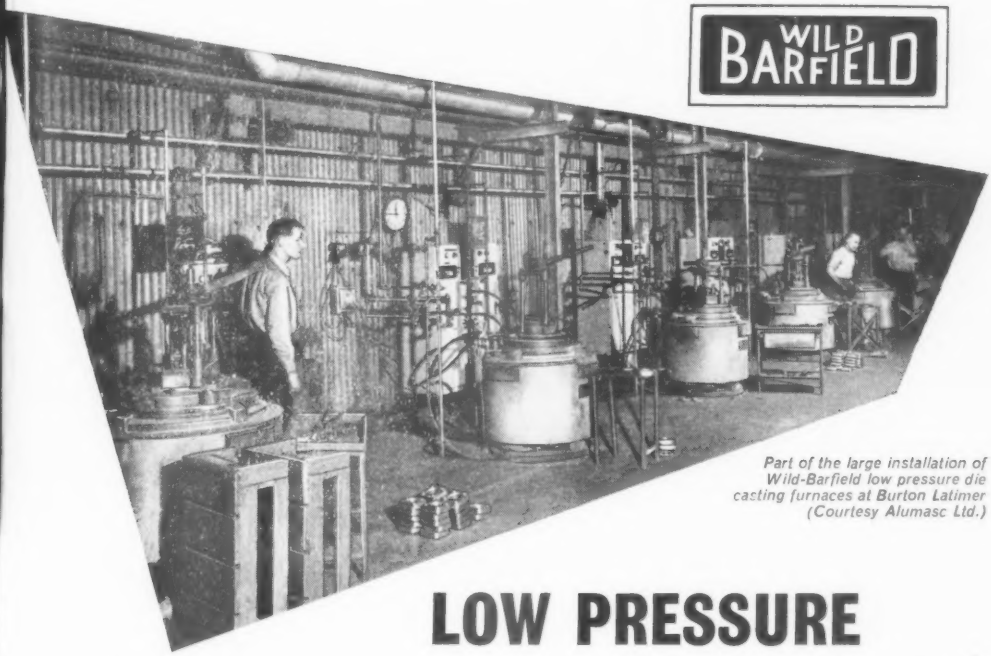

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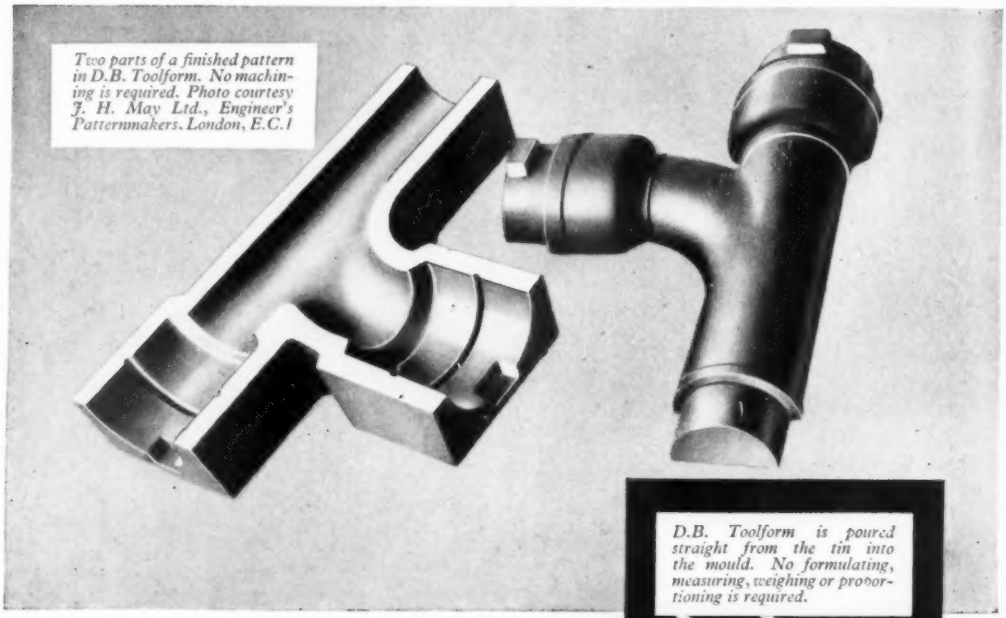

Two parts of a finished pattern in D.B. Toolform. No machining is required. Photo courtesy J. H. May Ltd., Engineer's Patternmakers, London, E.C.1

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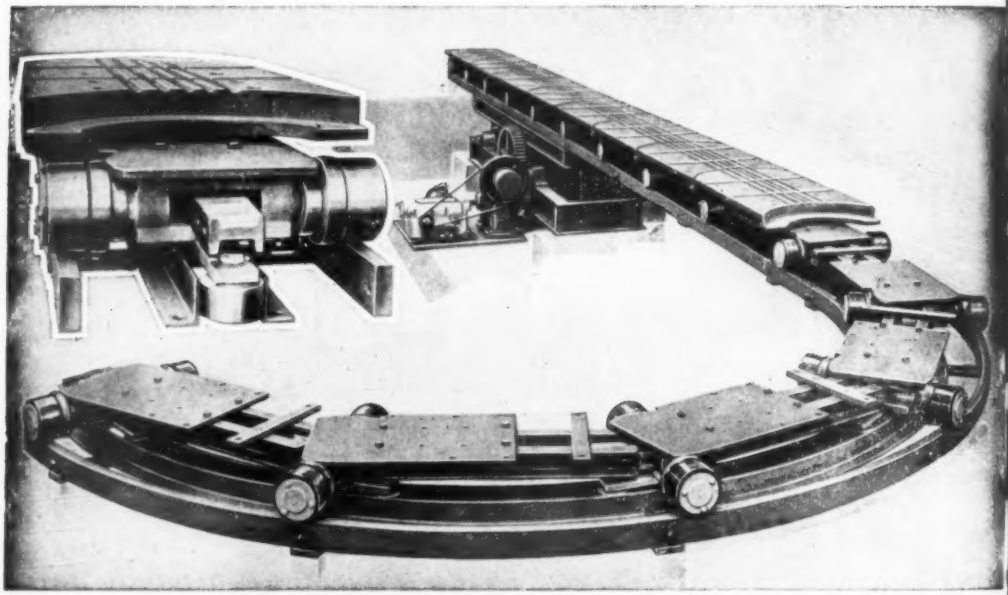
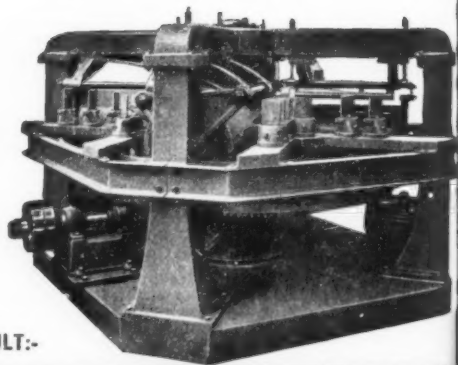


TYPICAL MOULD CONVEYOR SHOWING SOME C.I. PLATES REMOVED, ALSO DETAILS OF AXLES. SIZES TO REQUIREMENTS



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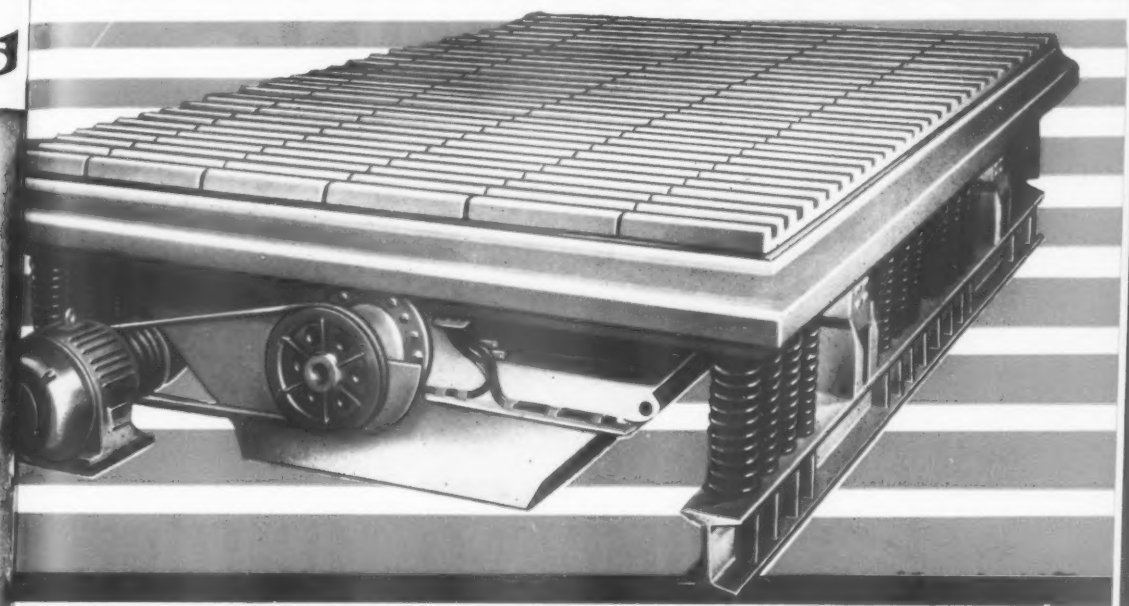

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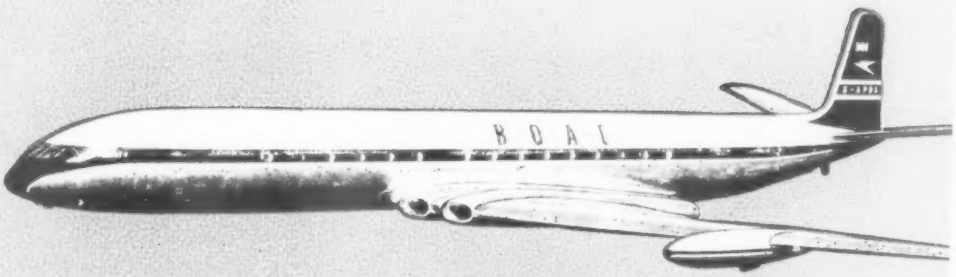

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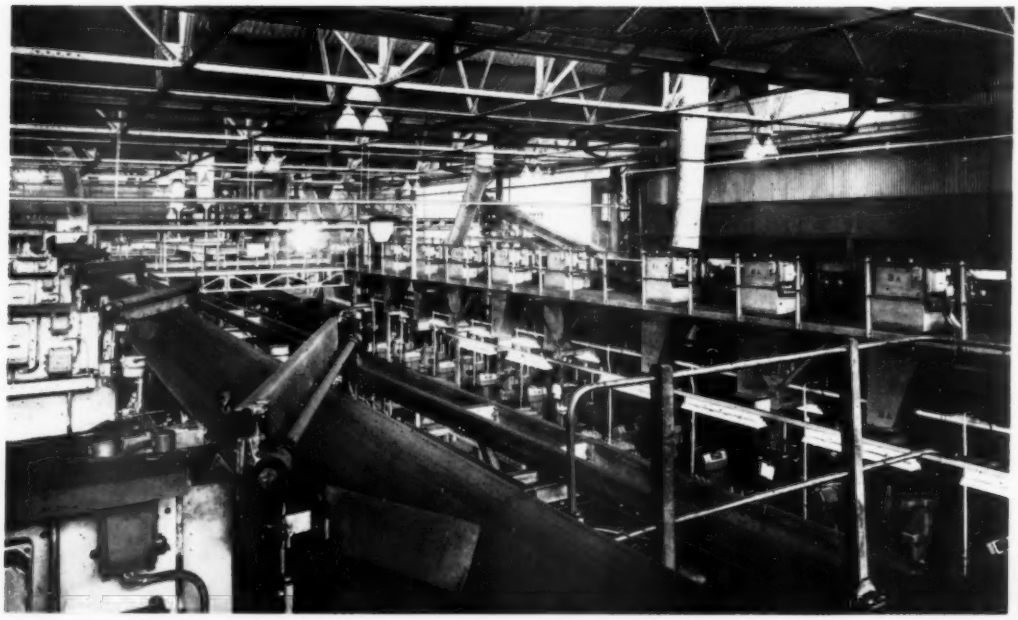

ILLUSTRATION ABOVE SHOWS VIEW OF SANDHANDLING AND DISTRIBUTION PLANT WITH TWIN OVERHEAD CONVEYORS FITTED WITH 16 *AUTOMATIC AND ELECTRONIC PLOUGHS*—ELIMINATING "*THE MAN OVERHEAD.*" *(PHOTOGRAPH BY COURTESY OF LEY'S MALLEABLE CASTINGS CO. LTD., DERBY.)*

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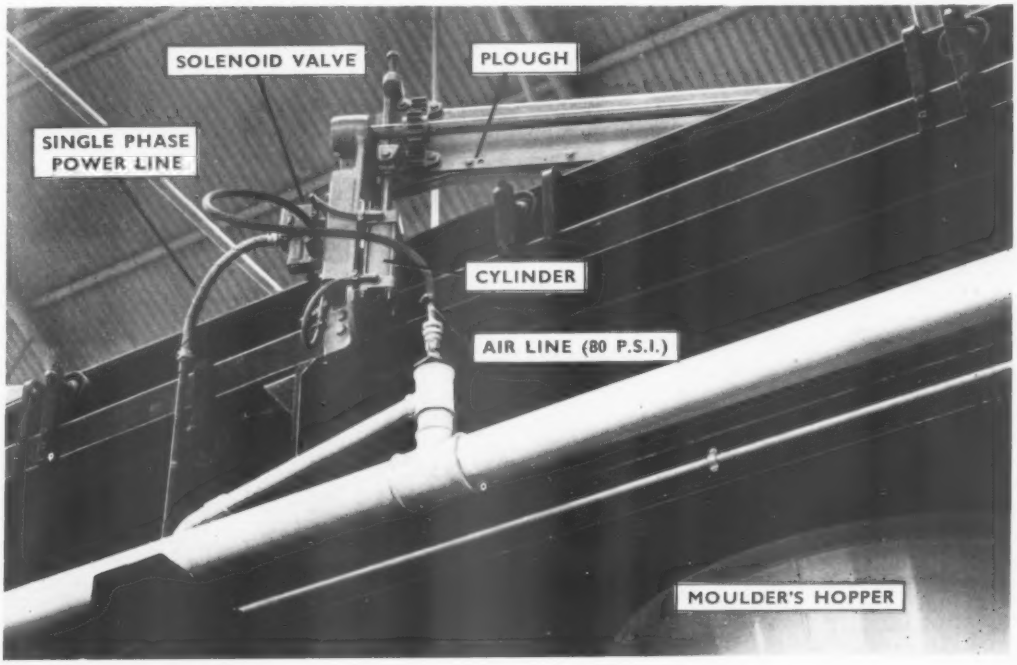

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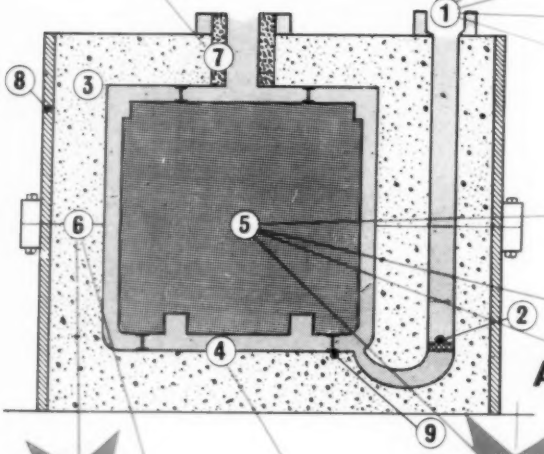

Key to Sectional Drawing of Mould

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1	Metallurgical Control use of Fluxes	3
2	Clean Metal by using Ceramic Strainer Cores and Discs.	4
3	Coal Dust additional to Facing and Backing Sand	1
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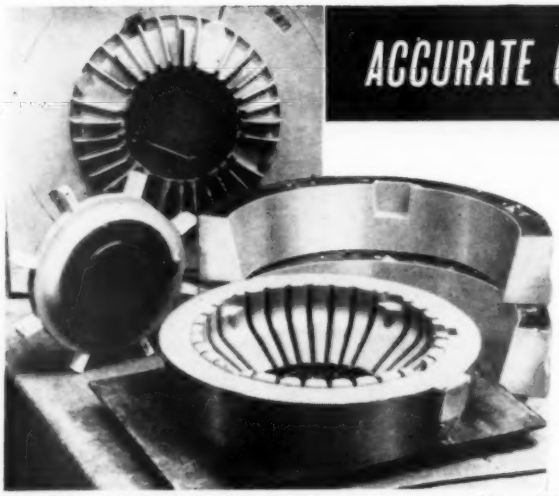

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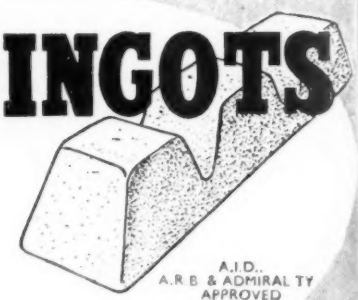

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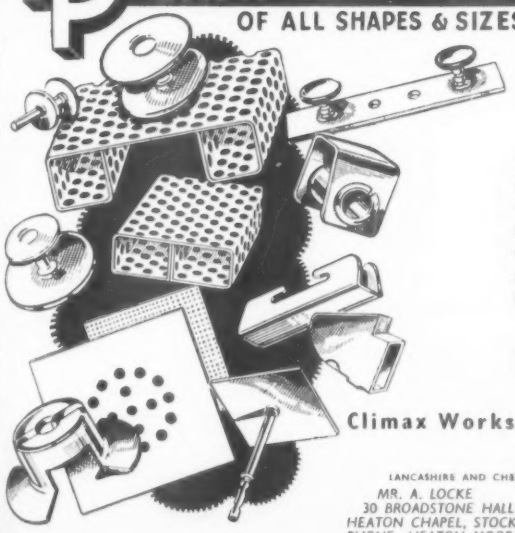

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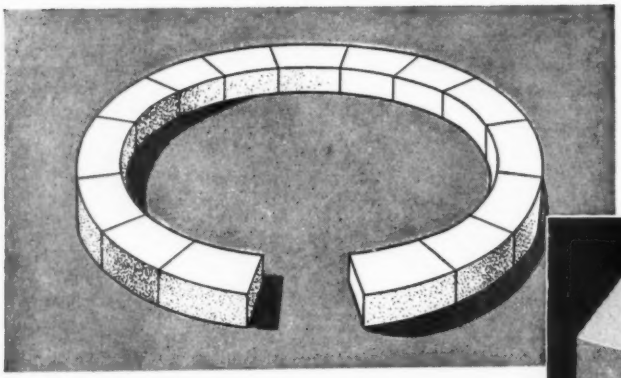

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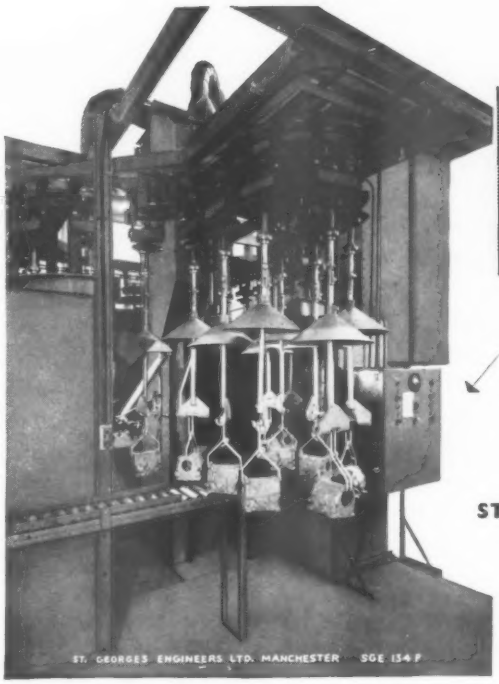

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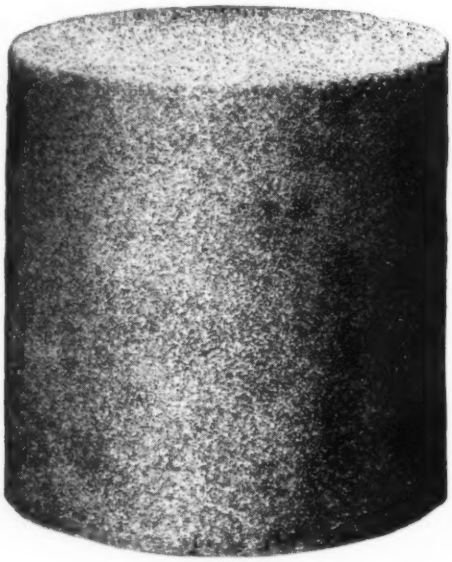

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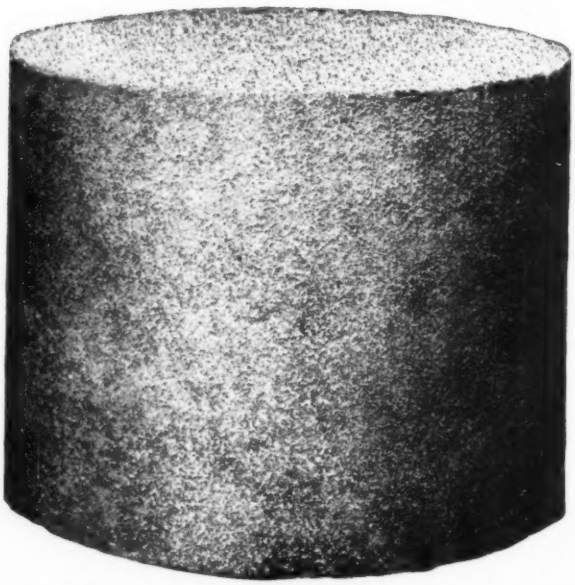

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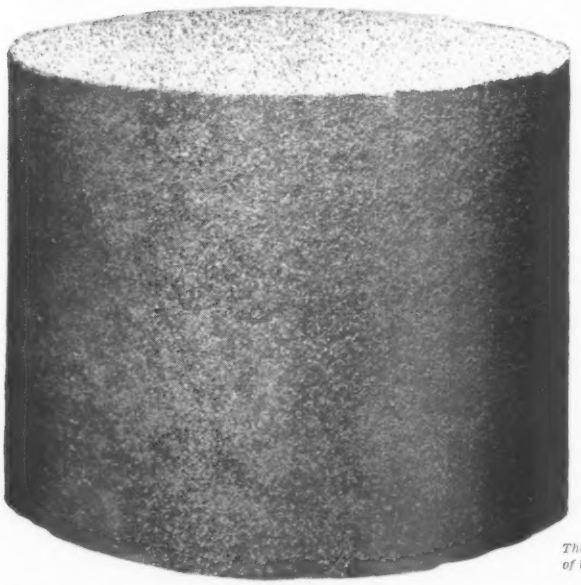

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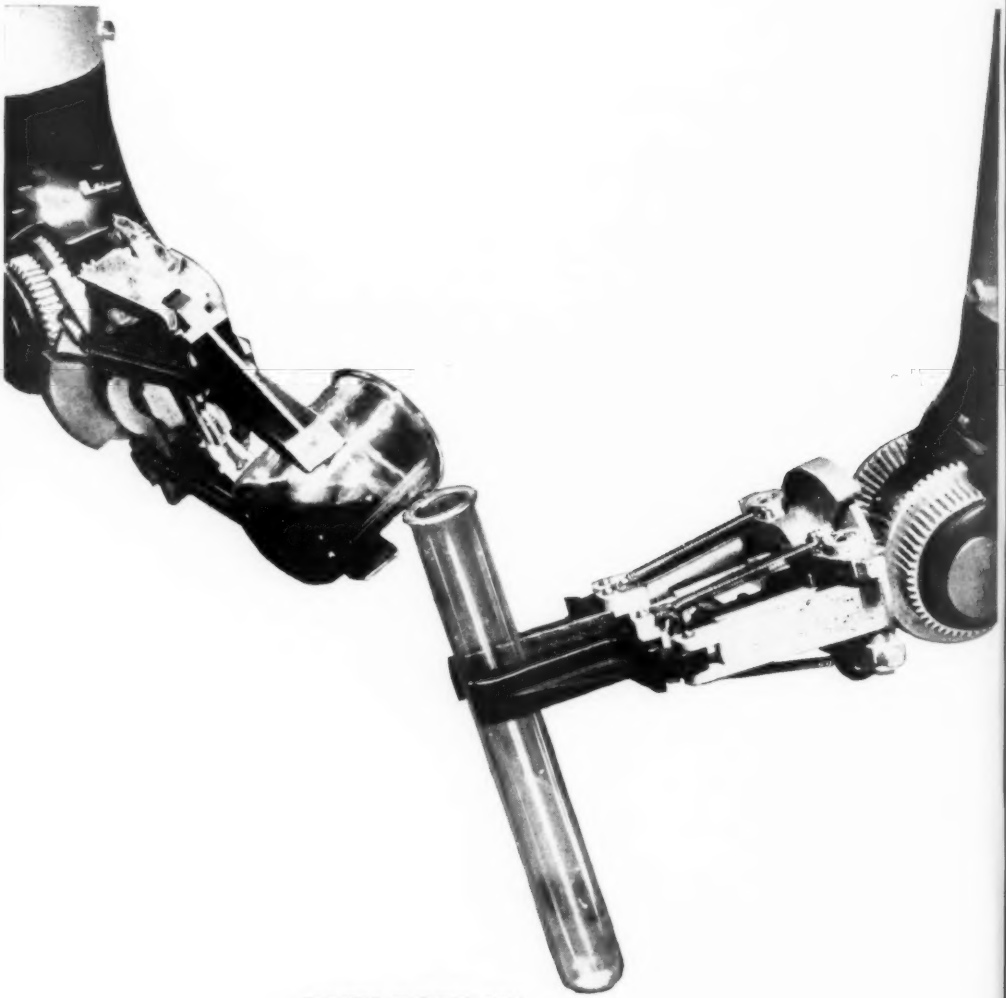

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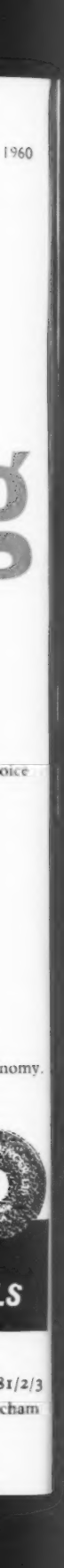
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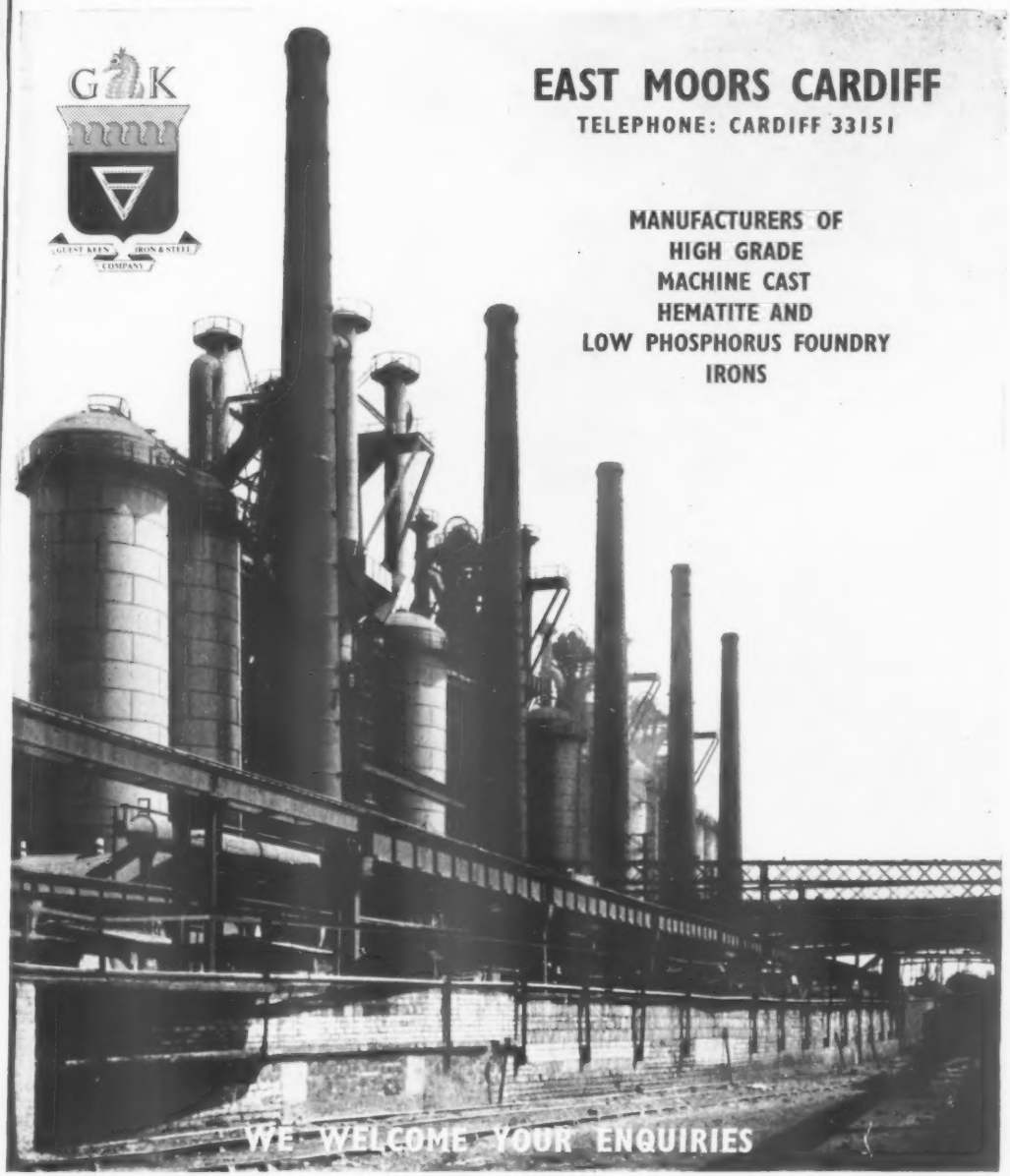

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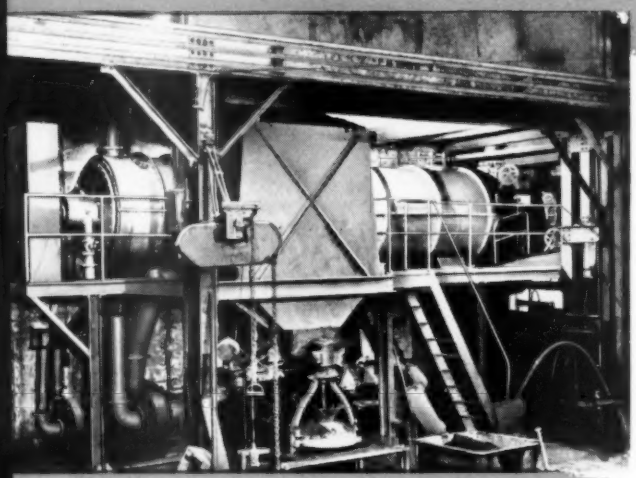

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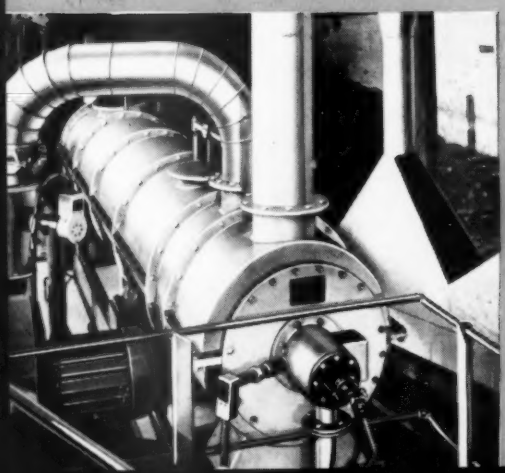

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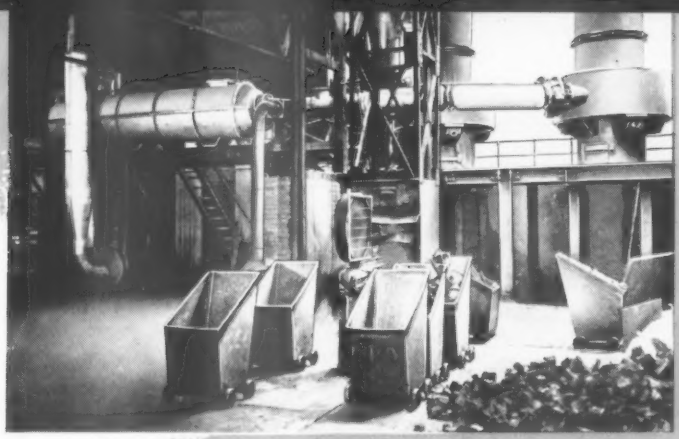

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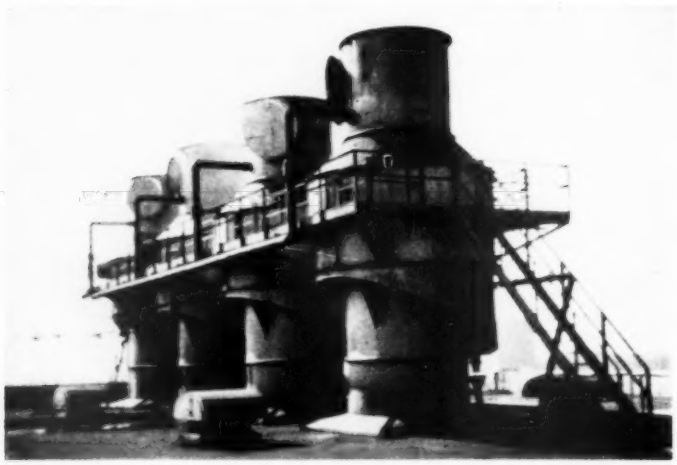

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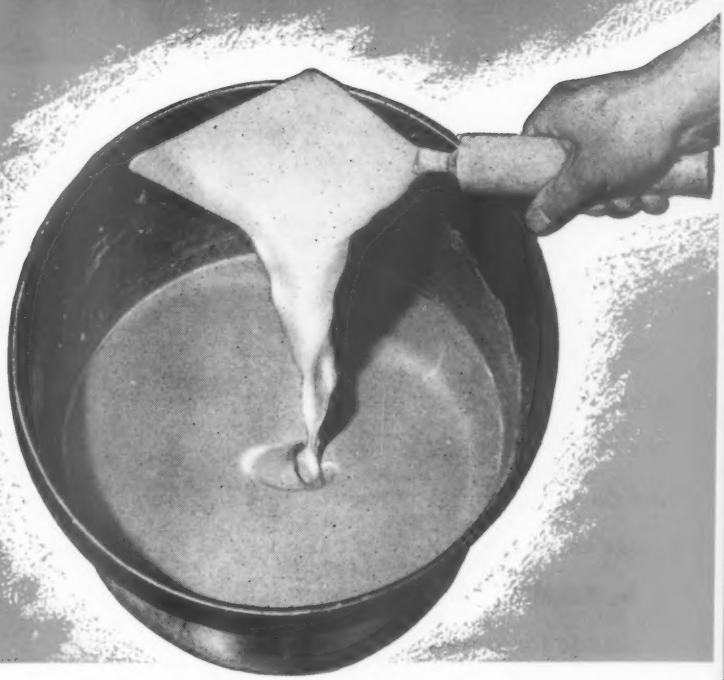

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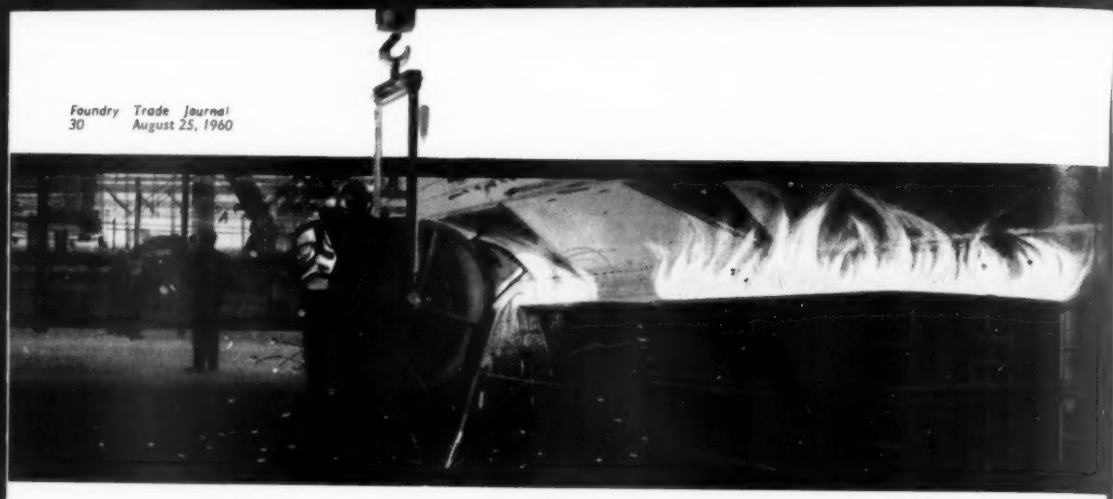

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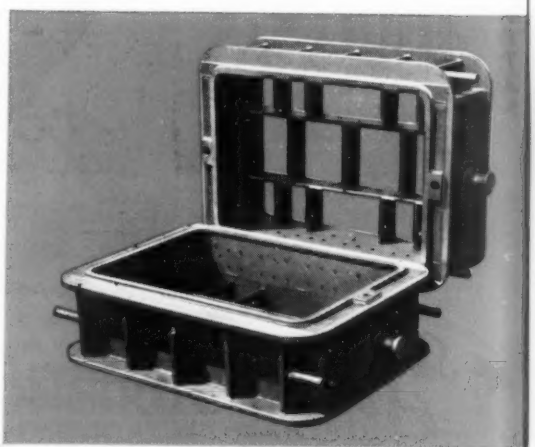

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Vol. 109 August 25, 1960 No. 2281

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PRINCIPAL CONTENTS

PAGE

Modern Trends in Foundry Practice—with Particular Reference to India

Review of founding developments in India from 1780 to the present day .. 223

Work-study To-day

By "Observer"

Basic principles and methods are followed by a comparison of work-study activities abroad with those of Great Britain .. 231

Blistering of Wet-process Vitreous Enamels in Cast Iron

By E. R. Evans and A. D. Morgan 233

Continental Appraisal of Light-alloy Castings

By L. J. G. Van Ewijk 235

Tendances modernes dans la Pratique de la Fonderie—avec un Accent spécial sur les Indes.
Revue des progrès techniques de la fonderie aux Indes de 1780 aux temps présents. 223

Bouillonnement des Emaillages de la Fonte, appliqués par le Procédé à voie humide. Par E. R. Evans et A. D. Morgan. 233

Estimation de la valeur des coulées en alliages legers, sur le continent. Par L. J. G. Van Ewijk. 235

Die gegenwärtige Entwicklungsrichtung der Giessereitechnikmit besonderem Bezug auf das Giessereiwesen in Indien.
Uberblick über die giessereitechnische Entwicklung in Indien vom Jahre 1780 bis zur Gegenwart. 223

Blasenbildung von im Nassverfahren auf Gusseisen aufgebrachtem Email. Von E. R. Evans und A. D. Morgan. 233

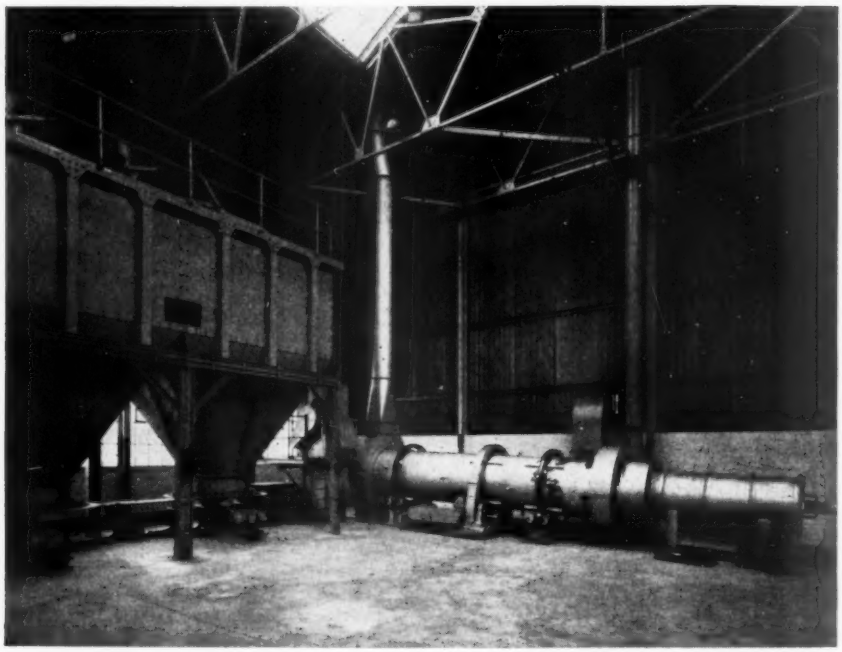
Die Bewertung von Leichtmetallguss in kontinentaler Einschätzung. Von L. J. G. Van Ewijk. 235

Features, News, Commercial Information and Statistics

Leader: Corebinding and Patternmaking .. 221
The JOURNAL's American Correspondent .. 222
Correspondence: Foundry Nomenclature and a Criticism .. 222
Bellfounding in the Eighteenth Century .. 230
Beilby Medal and Prize .. 230
Equipment and Supplies .. 237
American Letter .. 239
Difficulties in Exporting .. 240
Glenfield and Kennedy sells Compressor Subsidiary .. 240
Translation Service .. 242
House Organs .. 242
Company News .. 243
Allied Ironfounders and Bilston Foundries .. 243
News in Brief .. 244
Personal .. 246
Raw Material Markets .. 248
Current Prices of Iron, Steel and Non-ferrous Metals .. 250
Pig-iron and Steel Production .. 252
Publications Received .. 254

A Large Ironfoundry with CORE SHOP PLANT by August's LIMITED

Photograph published by courtesy of Associated Electrical Industries Limited, Hill Top Foundry.



Photograph shows:

A section of the Core Shop Plant in a large Ironfoundry. Two large Rotary Storage Hoppers feed the Wet Sand on to a Belt Conveyor and then to a Belt and Bucket Elevator to the Gas Fired Rotary Sand Drier. The dried Sand is then pneumatically conveyed to Large Storage Hoppers in the Mixing Section.

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FOUNDRY
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Vol. 109 August 25, 1960 No. 2281

Corebonding and Patternmaking

Modesty forbids us to relate some of the more disgusting materials that have been used as foundry raw-materials throughout the ages, when even the presence of a full moon was deemed essential for certain rites. This of course was in the days when crafts were mysteries. Coming to more recent times, there will still be a few old-timers who remember the use of stale beer. Since this panacea was discontinued the number of additives to sand has become legion. Some had but a short industrial life, and amongst those was the use of rubber derivatives. The newer ones, however, such as water-glass and resins have attained very considerable commercial success. A recent addition to the list on this side of the Atlantic was powdered peat, which is quickly establishing itself as a useful addition to moulding sand for "opening-up" the texture.

From the American technical Press comes news of two innovations—another type of corebinder and yet one more way of making pattern equipment.* The former employs a furfuryl resin/alcohol which is used with an acid catalyst. This new material is made from furfural which, in turn, is produced from such cheap materials as straw, peanut shells, corn-cobs and the like. So far as we can gather, furfuryl alcohol is not manufactured in this country but it is available from merchants. According to *Foundry*, our American contemporary, the binder is being used for the high-speed production of cores, using hot (about 200 deg. C.) coreboxes. The sand is prepared in a conventional mixer, the catalyst being first added and milled for two minutes, after which the furfuryl alcohol is added and milling continued for another two minutes. When the sand mix is blown into the hot corebox, setting is so rapid that the core can be stripped in 10 to 20 secs. As formaldehyde vapour is given off, adequate ventilation is called for. The collapsability of the cores after casting is said to be good. The carrying out of experiments in Britain should present no difficulties, and no doubt founders and suppliers alike will not be slow to seize on advantages or discover adverse aspects of the new material.

The new pattern equipment development, on the same lines as the report on page 237, was described also at the annual meeting of the American Foundryman's Society by Mr. J. O. Trimble. The process involves the use of nickel carbonyl ($Ni(CO)_4$), and it is obvious from an illustration shown there that a wide range of patterns has already been made. This nickel compound, when rapidly cooled, becomes a liquid resembling ether, but if the gas be heated to above 150 deg. C., it decomposes and deposits metallic nickel. Because of the dangerously toxic properties of nickel carbonyl, the process of making patterns is compliated by the necessity of providing a chamber, which before starting has to be purged of air by flushing with CO_2, and arrangements have to be incorporated for the burning of the by-products—CO and unused nickel carbonyl. This is obviously not a process likely to be undertaken in any other than the larger foundries or master-patternmakers' concerns. For one thing, transport of the nickel compound is not easy due to its toxicity and explosive character, and British Railways do not like handling it. However, in this case, also, it is certain that the development will be tried out and will find its own level among the various processes of pattern production.

* See page 237 of this JOURNAL.

The Journal's American Correspondent

The Editor is pleased to announce that Mr. J. S. Vanick, the celebrated American foundryman whose retirement from the position of research metallurgist with the Development and Research Division of International Nickel Company, Incorporated, of New York, was announced in the July 14 issue, is now acting as the FOUNDRY TRADE JOURNAL'S American correspondent. At the time of his relinquishing the position with the International Nickel organization, some details of his notable career were quoted, including the fact that before joining INCO he served as research associate at the US Bureau of Standards for the US Navy, and as engineer of tests with the British Ministry of Munitions. Since his retirement, Mr. Vanick has been occupied with consulting work.

MR. J. S. VANICK

Mr. Vanick has been a member of the American Society for Testing Materials since 1918 and for 26 years has been a member of committee A-3 on Cast Iron, serving as chairman from 1949 to 1954. Numerous other sub - committees of ASTM have benefited from his service and over the past year he has been—and still is—a representative on subcommittees dealing with general castings, nomenclature, methods of testing, heat-treatment, chilled- and white-iron castings, copper-base and copper-alloy castings, wrought copper and alloys and non-ferrous alloys. At the 63rd annual meeting of ASTM, Mr. Vanick was awarded the Societys Award of Merit "in recognition of outstanding and sustained service in ASTM technical work, especially the support of Committee A-3 on Cast Iron of which he was chairman for five years."

Mr. Vanick is active in the American Foundrymen's Society, and in addition is a member of American Society for Metals, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, National Association of Corrosion Engineers, American Welding Society, British Iron & Steel Institute, and British Institute of Metals. He was honoured in 1952 by the Gray Iron Founders' Society, the citation reading "for his outstanding contributions to metallurgical knowledge, improved production and wider use of gray-iron products, for his unstinting aid to foundrymen everywhere in the solution of industry problems, and for his valuable services in guiding the activities of the Society's Handbook and Technical Committees." In 1956, he was awarded the William H. McFadden Gold Medal of the AFS "for outstanding contributions to the Society and for valuable service to the ferrous-castings industry over a period of many years." Numerous papers and articles on metallurgical subjects are to his credit, as well as the development of the Ni-Hard abrasion-resistant and Ni-Resist corrosion-resistant irons.

[It is believed that readers will much appreciate Mr. Vanick's personal contributions from inside the American foundry scene—a service well in step with the JOURNAL'S rôle as the only weekly journal in the world devoted solely to the foundry industry.]

Correspondence

To the Editor of the FOUNDRY TRADE JOURNAL

FOUNDRY NOMENCLATURE AND A CRITICISM

SIR,—In the sketches used to illustrate the very interesting article "Gating and Feeding of Small Steel Castings," published in the June 23 issue of the JOURNAL, the term "breaker core" is very confusing. I have always understood a breaker core to mean the core producing the narrow neck between feeder and casting, desirable for removing the feeder after freezing. The cores so named in the sketches are surely those mentioned by your contributor at the bottom of page 785 as atmospheric cores?

I understand there is a move on foot to standardize foundry language. I have to carry out a good deal of liaison work between numerous foundries and engineers, dealing in all metals, and interpreting the various terms in use at present can be a major problem. In my view, the terms chosen should be those which most nearly imply the action used or the result obtained. Some terms are self-explanatory, others are very obscure. Some obscurity is caused by dialectal distortion becoming common use. In the Black Country, for example, the word "gate" is invariably pronounced "git" and I have seen it so spelt. But for the advent of more technological discussion, it might have come into universal use and its meaning lost.

Whatever terms are chosen as standard, I hope that they will be used slavishly by all of influence in the foundry world, regardless of personal preferences, since such standardization will greatly simplify discussion not only between founders themselves, but between founders and personnel of other industries.

Too Much about Mechanization?

Whilst writing, may I indulge in a mild criticism anent a matter which has perturbed me for a long time? I should like to see your JOURNAL devote more space to discussing and encouraging the basic business of founding and less to the subject of mechanization. I am convinced that by neglecting the more highly-skilled sections of the industry (*i.e.* loose-pattern work, etc.), the foundry world is losing its greatest qualification—versatility. By over-mechanizing, foundries are entering a field where—once simplification of design and high pattern-costs are accepted—competition from other processes will prove too keen. There is still a big demand for the casting requiring the peculiar skill of the foundryman, but the foundry industry is failing to meet this. This type of work is being turned down more and more by foundries who prefer to seek more straightforward work which can be plated or produced on mechanized plant. The skilled foundryman (and therefore the teacher of such skill) is being allowed to fade out, to the great loss of the engineering world generally. In the near future, lack of supply will dry up the demand and such work will have to be produced by less-satisfactory processes.

I believe that this could be discussed in print to some profit by using the experience of your readers and contributors, and that the foundry world would benefit greatly by a re-asessment of this most important section of the industry which, in my view, is already in jeopardy. The question is—why is the skilled job so unpopular?

Yours etc.

(Name and address supplied: the writer is attached to the planning department of a large electrical firm in the Midlands—EDITOR.)

Modern Trends in Foundry Practice . . .

. . . . with Particular Reference to India

Survey of History and Progress Leading to To-day's Developments in the Sub-Continent

In a paper which was presented to the Institute of Indian Foundrymen in Calcutta early this year, Mr. J. Blakiston, M.I.Mech.E., a past-president of the Institute of British Foundrymen, took for his subject "Modern Trends in Foundry Practice—with Particular Reference to India." Mr. Blakiston was well qualified to present such a review as he has been associated with developments in India for the past 15 years. What follows is a shortened version of the paper, which outlines founding developments in India as far back as 1780 to the present day. Illustrations, Figs. 1 to 11, have been loaned from Mr. Blakiston's private collection and serve to emphasize the many changes which have taken place in India during the period under review. (The whole makes an interesting complement to the survey of India's industrial expansion schemes published in the "Journal," August 11.)

Historical Background

Western methods as applied in India are not a recent innovation; as long ago as 1780 a works was established at Howrah, near Calcutta, by Colonel Swinton. Although there are few records of the foundry operations carried out, it is most likely that the re-casting of ordnance was attempted. The first iron production—other than by the historical Indian traditional methods—was at Porto Novo, Madras, by the Indian Iron Company, established in 1830 by an Englishman named Josiah Heap. The furnaces used were charcoal fired and it is most likely that they were operated with water- or oxen-manipulated bellows. The furnaces would resemble kilns in size and it is thought that no taphole would be used, the iron being scooped from a dam in front of the furnaces and transferred manually direct into moulds. These works at Porto Novo operated for over 50 years.

The next major attempt at the production of iron was the utilization of the pockets of semi-phosphoric ore around the Barakar coalfield, and hence in 1875, the Barakar Iron & Engineering Company was established.* These works incorporated extensive foundries and may have led to one of the reasons for the closing down of the Porto Novo works. Eventually, the plant was taken over by the Bengal Iron Company. In turn, this was absorbed (in 1936) into the Indian Iron & Steel Company of which it is now known as the Kulti Works. Steelmaking was brought into effect in 1901 by the incorporation of two 25-ton open-

* See Appendix, page 229.

FIG. 1.—*Typical village scene in India. It is from such sources adjacent to the foundries that Indian labour was recruited, though many of the modern plants include living quarters for the majority of workers and their families. In some cases, whole residential "towns" have been erected near to works, which are administrated by works personnel. (Against this background — and that shown in Fig. 2—the enormous development recorded in this article should be assessed).*

FIG. 2.—*Composite illustration showing two moulding crews at work in Indian foundries. Prior to the 1939-45 war, Indian labour was regarded as relatively inexpensive and mechanical devices were little used, largely because facilities for maintenance were missing. The modern trend represents a complete reversal of this policy, and techniques and machinery, equivalent to Western standards, are becoming increasingly adopted.*

hearth furnaces and a rolling mill. Later this steelmaking side was discarded at Kulti.

Original Tata Works

Tata's began making steel in 1909, and by this time realization of the value of the vast, rich ore-deposits in Bihar, containing 60 per cent. iron, brought about the major change in Indian iron-making technique which was the forerunner of to-day's practice. In the early days, the main type of castings required for India were those used by the railways, comprising cast-iron sleeper chairs and railway maintenance components, with pipes of all types essential for irrigation and agrarian development. India owes an unpayable debt of gratitude to the training of artisans and technical personnel in the railway workshops and had it not been for this pioneer work, many of the present-day projects would have been practically impossible to implement. By the turn of the century, a tradition in engineering foundrywork (although small) was being firmly established.

Twentieth-century Development

Quite an important development took place in 1920 when the Eastern Light Castings Company was founded (at a location which is very close to the Kulti Works). Up to that date, it had been stated that on account of the absence of irons high in phosphorus, the establishment of a

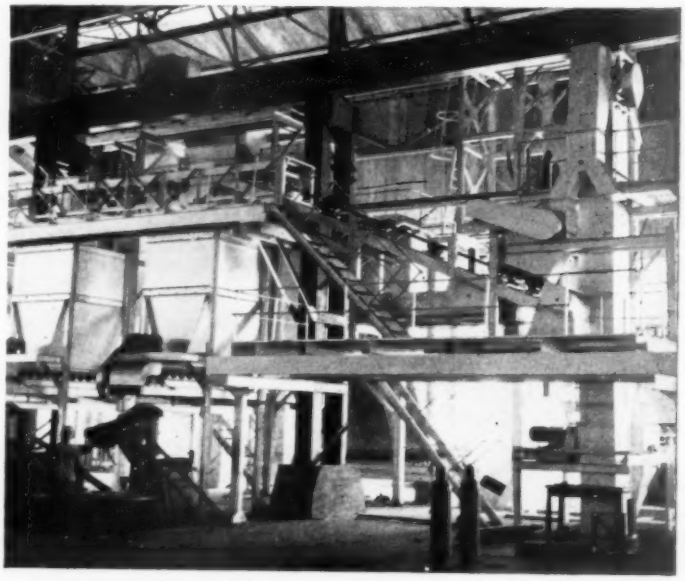


FIG. 3.—*In direct contrast to Fig. 2, this illustration shows the sand-preparation plant in the new Kulti steel foundry in West Bengal.*

light-castings industry, based on traditional Scottish methods, would be out of the question. However, the late Mr. John Cameron took advantage of experiments which had been made in introducing phosphate rock to the blast-furnace burden and proved it was possible to produce castings even of leaf thickness. (This he established beyond doubt by utilizing the leaf of a sacred tree as a pattern and reproducing it in cast iron.) Eastern Light Castings established a production rate of 500 tons per week; the plant originally installed was years ahead of its time in India, and incorporated such items as coremaking machines for guttering and fall-pipes which were then quite novel in the UK. These works also were absorbed into the Indian Iron & Steel Company along with the Bengal Iron Company, of which they were then a part.

Associations with Prominent UK Founders

It is interesting to record, in passing, that a number of past-presidents of the Institute of British Foundrymen were associated with Indian foundry developments, Mr. R. B. Templeton followed Mr. John Cameron, the late Mr. P. H. Wilson was responsible for bringing into operation the first spun-pipe foundry, and now Mr. Charles H. Wilson who was IBF president 1959/60, co-operated in the inauguration of the new spun-pipe plant at Kulti, manufacturing up to the largest-size spun pipe, by world standards.* Many of the present established foundries with complementary engineering works stand comparison with any in the world. Amongst these, the Indian Iron & Steel Company produce 15,000 tons of finished castings per month, and the Jay Engineering Company (manufacturers of light engineering units such as sewing machines, fans, etc.) actually export to Europe and America.

The foresight which established a pipe-spinning plant in 1945 working on the Stanton-Cochrane system of producing pipes up to 14-in. dia. was followed by the installation of a new spun-pipe plant in 1958, producing pipes up to 30-in. dia. The new National Foundry/Forge plant presently being established at Ranchi visualizes the manufacture of iron castings up to 100 tons in weight at a production rate of 38,300 tons, while the steel foundry is planned to make steel castings up to 150 tons in weight at a rate of 45,000 tons per annum. (This latter project is being implemented under the auspices of the Czechs).

Developments in Patternmaking

Because of the necessity of using expensive woods to resist climatic and insect attack, patternmaking in India has always been an expensive adjunct to foundry production. The majority of patterns are made from Indian U.P. teak. The use of tungsten-carbide-tipped circular saws has proved economical in many cases for the breaking down of teak logs, when it is possible to back this equipment by adequate toolroom maintenance. The introduction of epoxy and other resins may prove extremely acceptable and, for repetition work, the adaptation of the system of making patternplates by casting aluminium under pressure in plaster moulds results in the production of a more competitive and accurate type of light casting. It can be stated in general terms that the use and adaptation of aluminium patterns as a substitute for wood should be a much more attractive proposition in India than in most Western countries. The machining of these patterns to accurate limits has been considerably simplified by the introduction of such tools as the Wadkin universal pattern-milling machine, now fitted with power traverse-tables, with verniers. Although the capital cost of this unit is higher than some of the simple woodworking machines, the production *per capita* is extremely high, even when compared with making a pattern in wood.

Moulding Materials

The sub-continent of India contains some of the finest deposits in the world of moulding sands of all types. These are widely distributed and a worth-

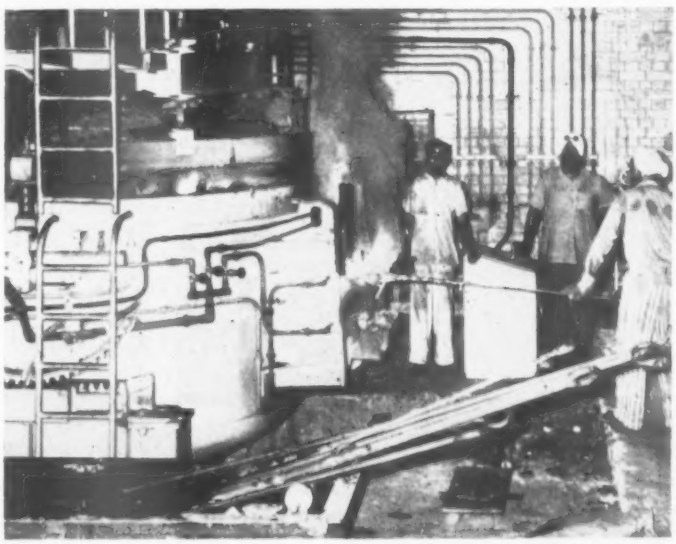


FIG. 4.—*Modern melting equipment for foundries in India includes the use of direct-arc furnaces of considerable size, of up-to-date design and with full ancillary control equipment. (Photograph taken at the Kulti steel foundry.)*

[The writer modestly omitted his own name from this list—EDITOR.]

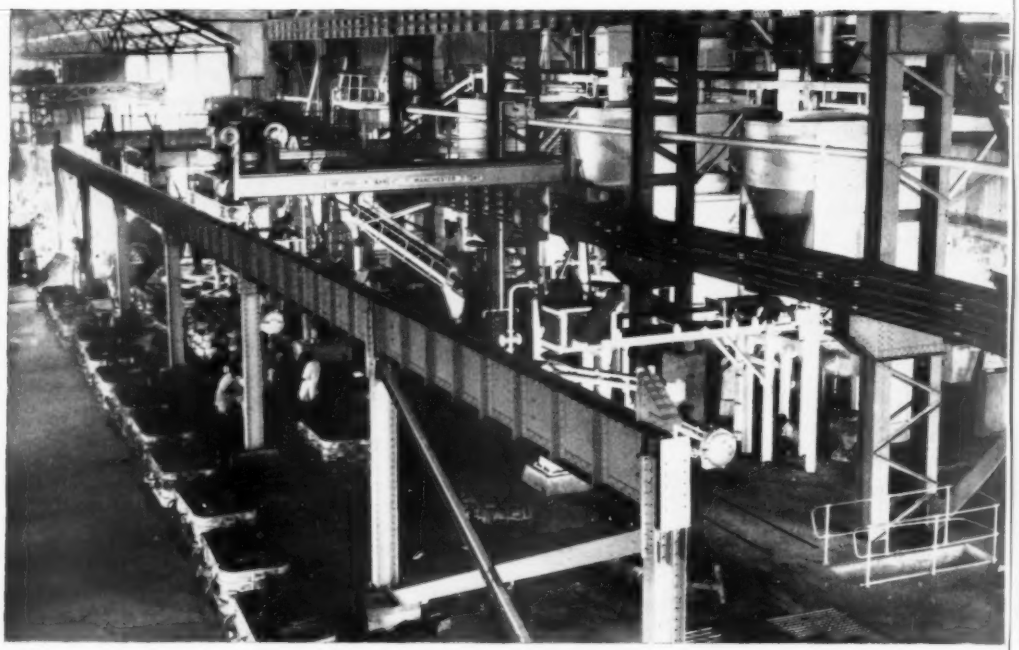


FIG. 5.—*View of a mechanized foundry, also at Kulti, for producing standard pipe "specials." Note the provision of adequate space, the installation of much equipment overhead, the orderly arrangement of moulds, floor knock-out grid and sand plant (at the rear, right-hand side).*

while attempt at correlation of sources and varieties has been made by the National Metallurgical Laboratory, Jamshedpur, under the auspices of Dr. Nijhawan. It has been found that Indian bentonites can be modified for foundry application by alkali additives and there is considerable scope in this direction. Foundry-sand development in India—when considered in relation to increasing costs of fuel and heating mediums—seems to be stabilizing along the lines of utilizing the sodium-silicate/CO_2 process. This method has been augmented particularly in the coremaking section by the introduction of self-setting core compounds and accelerators. The introduction of the coreshooter—an improved version of the orthodox coreblower—has enabled sands of practically any bond to be handled.

It is interesting to record in this context that a large steel foundry recently installed at the Kulti works was planned with no stove accommodation other than a small tower-type stove for special

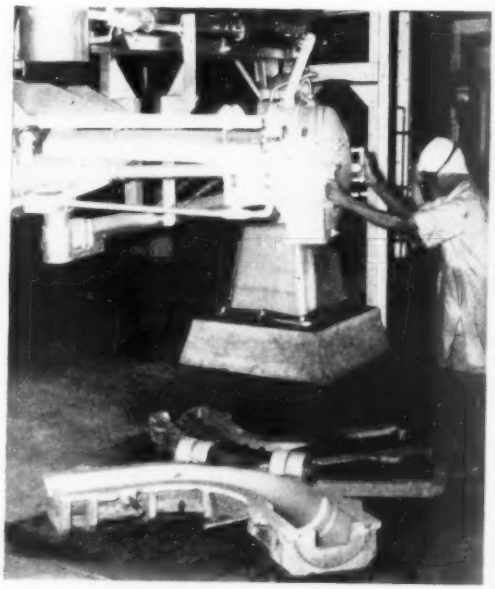


FIG. 6.—*Also in the standard "specials" foundry, an operator is shown ramming in the core for a pipe-bend casting using a fixed-type 'slinger unit.*

cores—the accent being placed alternatively on sand-preparation plant. The results have more than justified the change in emphasis and when any extraneous skin-drying has to be resorted to, the use of electrically-powered Brown Boveri pressure-driers has been incorporated. By this means, it is anticipated that it should be possible to develop steel-casting production to cater for the heaviest component, producing a casting with a much superior skin-finish than hitherto and affecting major fuel-economies and eliminating the capital cost of major stove-installations.

Moulding Methods

The application of Western mechanized moulding methods has proved itself in many Indian foundries. Probably because of the high permeability of many of the sands available, it has been revealed that considerably more latitude is permissible with regard to ramming density and maximum permissible moisture-content. Because of this factor, the plain jolting machine for heavy duty appears to have given the most satisfactory results and machines of this type up to 20-tons capacity have already been installed. Sandslinging has also proved successful, but in practice it has been found that the wear and tear on the 'slinger heads is greater than that normally expected, and it is advisable to operate these units with the largest permissible head-size diameter with a corresponding reduction in r.p.m.—so as to retain the correct peripheral velocity. Indian foundry labour if trained correctly in the first instance and provided with correctly-designed equipment can equal any established production rates, but once the initial practice has been established in a given plant it is extremely difficult to introduce variations. No approach has yet been made in India towards the installation of fully-automated moulding units, as maintenance is one of the primary factors in the operation of such systems and as yet this is one of the weakest links in Indian industrialization policy.

FIG. 7.—*This operator is lowering the core into a mould for a pipe bend. Note the use of a balancing core-iron.*

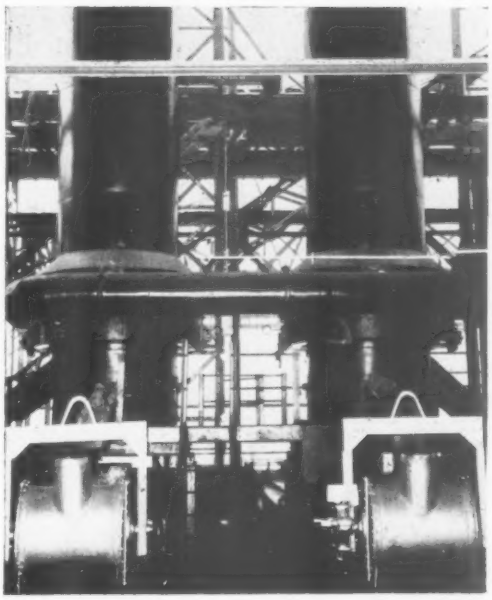


FIG. 8.—*Pair of modern cupolas (mechanically charged) photographed while under construction at the new pipe foundry. Geared barrel-type ladles are also shown.*

Materials Available

There are very few areas of the world so well endowed as India in regard to rich local deposits of essential raw materials. However, the adaptation of Western manufacturing and production methods must always be tempered by the necessity of modification to comply with labour, material and climatic conditions. The latest blast-furnaces in India are achieving record outputs of as high as 1,300 to 1,400 tons per day, of an iron low in phosphorus and ideal for the manufacture of the rimming-type steels. Production of steel castings, using direct-arc electric furnaces on a single-slag basic method, also results in high-quality castings. Offset against this, the presence of some phosphorus in practically all irons, together with a phosphoric-ash contamination from the coke, makes it very

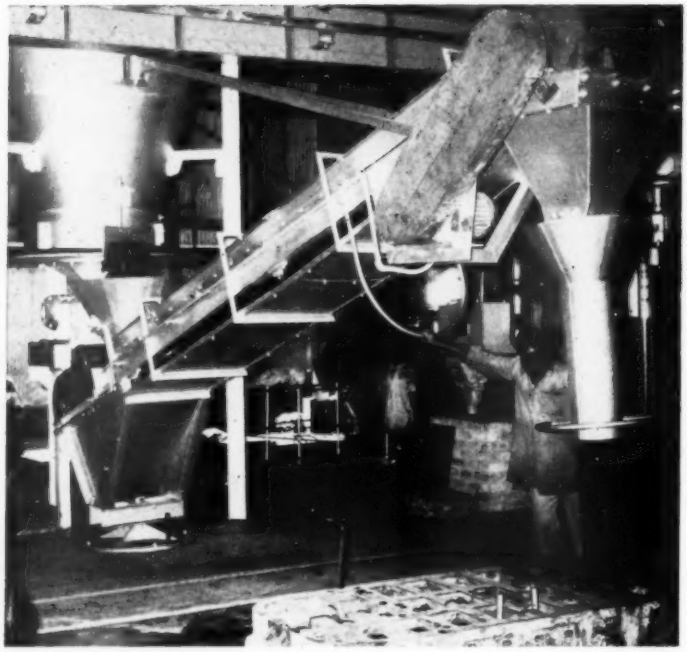


FIG. 9.—*At the same foundry as Figs. 5 to 8, a novel method of introducing backing sand from a swinging delivery-belt and funnel is shown in this illustration. Sand is obtained from the fixed hopper, with a rotary delivery-plate and adjustable plough feed, situated in the background.*

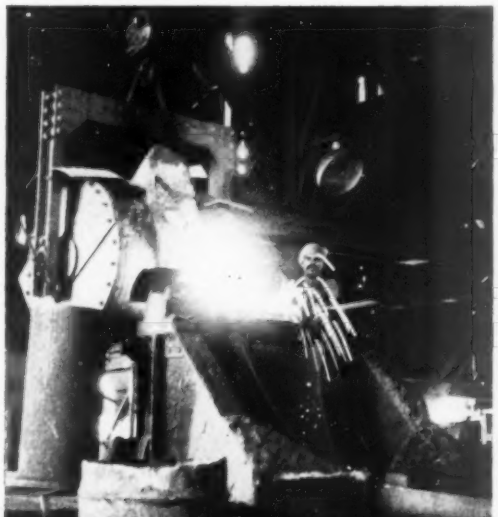
difficult to produce a pure hematite type of iron or to operate acid processes of steelmaking, or yet the bulk production of malleable-iron castings. The trend of composition of the foundry cokes available in India show a progressive increase in ash content over the years, for ash now ranges even in best-quality cokes at approximately 25 per cent. However, despite the high ash-content, the metallurgical coke is extremely strong and provided cupola technique is adjusted accordingly, will be found to give good results and melting efficiencies, provided comparisons are made on the basis of carbon content and increased slag. An analysis of one of the best Indian foundry cokes at present available and which is giving excellent results is as follows: Moisture 3.76; ash 24.16; volatile matter 1.26; fixed carbon 74.58 and sulphur 0.56 per cent. (on a dry basis).

Cast-iron scrap is a scarce commodity in India, whereas pig-iron is relatively plentiful and in many cases cheaper. Most steel scrap which arises—because of increasing industrialization—will require to be diverted for the manufacture of steel-castings production. On account of this, the Author visualizes the development of cold-blast cupola operation (with occasional oxygen addition) coupled with duplexing, either through electric induction furnaces or receivers.

Pig-iron

Reverting to the supplies of pig-iron, the new blast-furnace installations in India are of extremely high capacity and are likely to give bulk supplies of pig-iron to a fairly constant composition. It must be borne in mind that these new blast-furnaces were put down as part of integral plants for manufacturing steel, pig-iron production for foundry purposes being secondary. There is a growing conviction in India favouring the installation of several low-capacity blast-furnace units of approximately 750 tons per day, each to produce a wide variety of irons suitable for foundry and metallurgical processes. These units would preferably be located at a port area (such as Calcutta, Madras or Bombay) so that apart from producing

FIG. 10.—*Filling a pouring tundish at the new Kulti pipe foundry. The pouring trough and part of the pouring launder—which extends the full length of the pipe mould—is in the foreground.*



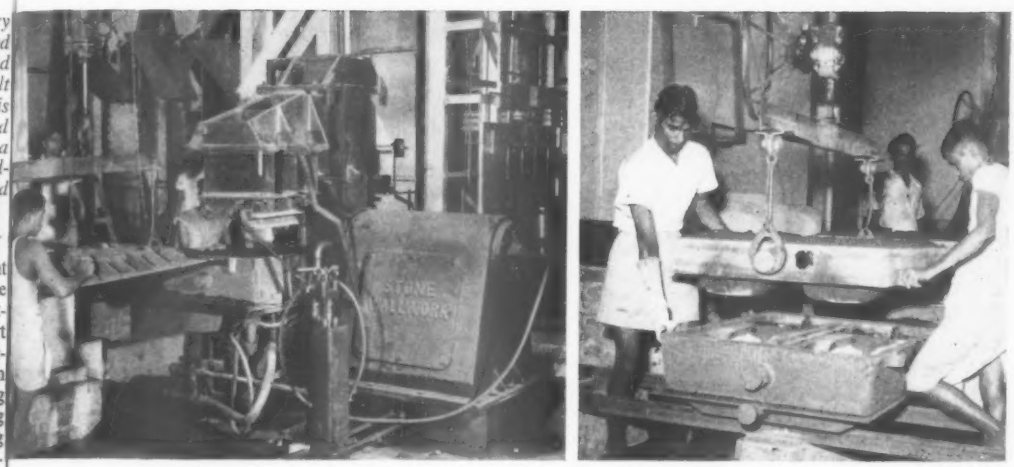


FIG. 11.—*Views of moulding and closing at the Howrah foundry of Burn & Company (which was one of the first foundry mechanization schemes of any size to be attempted in India).*

foundry iron for a given market centre, they could also contribute gas and electric power to local town services. The raw materials, such as ore and coal, being carried by sea transport which, even when covering a much greater distance, would be reasonably competitive to overland rail transport.

* *

APPENDIX

It is interesting to record additional details* of the first major iron foundry establishment in Bengal, India (about 150 miles from Calcutta), as follows:

The Bengal Iron & Steel Company, Limited, was originally established in 1875 by the Barakar Iron Works Company (frequently spelled Burrakur), but after several vicissitudes, closed four years' later. Some time afterwards, the Government took over the plant, and after some additions were made, the works were restarted and carried on for about 8½ years, when they were acquired by Bengal Iron & Steel in 1889. At that time, the plant consisted of two small open-top blast-furnaces for which the blast was heated by coal in pipe-stoves and there was one steam-driven blowing engine. The foundries then covered an area of about 12,300 sq. ft., pig-iron production was 9,000 tons and iron castings 3,800 tons per annum.

Following the takeover, a third and more modern blast-furnace with a closed top was built and three 17-ft. Cowper stoves were provided for heating the blast. The two earlier blast-furnaces were also converted into closed-top units to enable blast-furnace gas to be used for boiler firing. Later, these two furnaces were demolished and replaced by two furnaces, modern by the standards of the day. The company also decided to install a steelworks and this was erected and in operation—using Siemens Martin basic open-hearth furnaces, with a capacity of 20,000 tons per annum—during the period 1902 to 1905. However, this step was unprofitable and steel production was discontinued.

Period up to 1914

In the period of progress up to 1914, new collieries were built by the company and, in 1910 to 1911, an important advance was the opening up of the company's newly-acquired ore-field at Manharpur in Kolhan State, Singhbhum, which rendered the blast-furnaces independent of the local iron-ore shales. These latter ores, on which iron production in the area had been based, contained only 40 to 45 per cent. iron as compared with vast Manharpur ore-deposits having iron content of about 60 per cent.

At the outbreak of the first world war, pig-iron capacity was 80,000 tons per annum and the foundries then included a new vertical pipe foundry, the only one in India, a new general castings foundry and a patternshop, together with the older pipe foundry and a railway-sleeper shop to a total capacity of 35,000 tons of castings per year. There was also a modern machine-shop, smithy and riveting shop, and two batteries of 34 by-product coke ovens, complete with tar-recovery, ammonia, and sulphuric-acid plant. The first war period was one of delayed progress, but a new foundry for sleepers to produce 45 tons daily was opened in 1916 and a new blast-furnace was blown in early in 1917.

Post 1914-18 War

Soon after the war, the company put in a fourth battery of coke ovens, another new blast-furnace (with mechanical charging), a new sleeper shop, and a foundry for making vertical-cast pipes over 12-in. dia. This brought the pig-iron output to 55,000 tons and the cast-iron sleeper output alone to 25,000 tons yearly.

At this period (1921), the company employed at Kulti about 100 Europeans and some 1,100 Indians and organized the township which provided them all with residential quarters. There was also a hospital with its own operating theatre at the works and the company, besides providing accommodation, procured

* From booklets issued by the Bengal Iron & Steel Company, Limited, and the Bengal Iron Company, Limited, kindly loaned by Mr. S. Hague, B.Sc., A.M.I.C.E., engineer consultant, of Martin Burn, Limited (London Agency), which firm represents Indian Iron & Steel Company in this country.

Modern Trends in Foundry Practice—Appendix

foodstuffs on a large scale for sale to employees at cost.

The last booklet available which was published by the Bengal Iron & Steel Company, Limited, discloses that the foundry then consisted of two pipe foundries producing vertically in dry-sand moulds, one using hydraulic power and the other electric power. Pipes were subsequently treated with Dr. Angus Smith's solution and pressure-tested before despatch. The railway-sleeper and -chair foundry (460 ft. by 80 ft.) was equipped with moulding machines for producing sleepers of either plate or bowl designs as well as chairs, and the general foundry (290 ft. by 80 ft.) was producing castings up to 10-tons weight including columns and posts, mills and road rollers and water-works castings. It is clear there was also a brass foundry then in existence, although its size is not disclosed. The total production then amounted to about 8,000 tons of pipes, 12,000 to 15,000 tons of sleepers and chairs, and 6,000 to 7,000 tons of general castings. The same booklet quotes the composition of the two grades of pig-iron produced as "Manharpur"—T.C. 3.2 to 3.6, Si 2.75 to 3.25, Mn 0.2 to 0.25, P 0.15 to 0.25, and S 0.01 to 0.02 per cent., and "Bengal"—T.C. 3.30, Si 2.5 to 3.0, Mn 0.9 to 1.2, P 0.8 to 1.0 and S 0.03 to 0.06 per cent.

In the early '30's, the Bengal Iron Company as it was then known took over Eastern Light Castings Company, Limited, which had been established on a site nearby for the production of cast-iron rainwater goods, rice bowls, etc. of thin section. Then, as has been recorded in the article, in 1936, the Indian Iron & Steel Company, Limited, was amalgamated with the Bengal Iron Company, Limited, whereupon the name of the latter disappeared from future trading.

Beilby Medal and Prize

An award has been given to British investigators in science in recognition of independent original work of exceptional merit, over the past 20 years through the Sir George Beilby Memorial Fund. This year the Administrators of the Fund announce that as well as an award of money a gold medal will also go to the winning candidate. This award will be known as "The Beilby Medal and Prize" and will be awarded biennially. More than one award may be made on the same occasion if there are several candidates of sufficiently outstanding merit. In 1958 two awards, each of 150 guineas, were made.

Outstanding work of the nature indicated may be brought to the notice of the Administrators, not later than December 31, 1960, and the letter containing nine copies of the relevant particulars concerning previous career of the candidate, etc., should be addressed to: The Convenor of the Administrators, Sir George Beilby Memorial Fund, Royal Institute of Chemistry, 30, Russell Square, London, W.C.1.

OVER 93,000 employees of Imperial Chemical Industries, Limited, have qualified for bonus in respect of 1959 under the company's profit sharing scheme. The bonus amounts to £5,523,000 (£4,131,000), after personal income tax, giving an average of £59 4s. 10d. (£44 6s. 7d.) per employee. The trustees of the scheme are to acquire on behalf of the employees £1,825,000 ICI ordinary stock to be issued by the company for this purpose out of its unissued capital. When an employee has 40 or more units to his credit the stock is registered in his name.

Bellfounding in the Eighteenth Century

By T. R. Harris

Although by the eighteenth century, many bell foundries were well established in various parts of the country—at Whitechapel, Gloucester and Bristol—many of the bells for remote country parishes were cast in the vicinity of the churches, as transport facilities were unsuitable for the conveyance of such items over the indifferent roads of the day. Thus, evidence can be found of the work of itinerant bellfounders in some of the place names of various parishes. For example, in the parish of St. Breward in Cornwall, there was up to comparatively recent years a spot just outside the chuchyard fence—and due east of the church—known as the "Bell Garden." To-day, however, this land has been absorbed into a field and has thus lost its identity. Nevertheless it was here that four old bells, ranging in size from 31- to 40-in. dia., at the mouth, were recast in 1758.

At Lanteglos Juxta Camelford, also in Cornwall, there was a tradition that the bells of 1783 were cast in a field near Helston and, in the mid-decades of the last century, there were many old people who talked of their fathers throwing shillings into the furnace to improve the tone of the metal. In an old account book of the Cornish parish of St. Wenn, there is an entry for the year 1777 of a payment of five shillings to the churchwarden for "going to St. Neot to contract with the bell-founder." From another source, it is learned that during this year also, the Penningtons—one of the principal families of itinerant bellfounders in the West Country—were at St. Neot, casting a peal of bells in an orchard adjacent to the church.

Sizes and Costs

What is perhaps the most interesting of the local documents dealing with bellfounding is that concerning a bell of 46-in. dia. at the mouth, cast at St. Buryan in 1738. The churchwarden's expenses on this occasion were headed: "charge about casting the Great Bell" and from this it is learned that the founder was paid £15 7s. in money and spare metal to the value of £4 13s., being "four score and thirteen shillings." The mould for this bell was made of local clay which cost 3s. 4d., and a man was paid 1s. 8d. for two days in digging it out. "Eight hundred and a quarter" bricks were used, together with a number of "Winsor and Stourbridge" bricks for the mould and the furnace. The fuel used for melting the metal was coal—the entry reading "for 20 stricks of sea cole, 13s." A strick was a local pronunciation of strike—a measure used for grain and equal to ½ gal.—so that the fuel was measured, not weighed. "Sea cole" was, of course, the term used for coal at that time, as it had to be brought from South Wales by sea. [The same term is still used in America, as sea coal, for the coaldust used in iron-founding—Editor.] The total cost of making and erecting the bell was £33 19s. 11d.

Work-study To-day

By "Observer"

An article in "Productivity Measurement Review" (published by the European Productivity Agency) refers to a Belgian foundry which more than trebled its output in terms of kilos of castings per man/hour over a period of ten years as a result of a thorough reorganization of its operations. This achievement—and other such cases are quoted in the article—induces some reflections on the measures being taken abroad to increase industrial efficiency compared with similar activities in Great Britain.

Under the stress of competition, the light industries of Great Britain long ago accepted time- and motion-study as being indispensable as a condition of existence. To-day, the emphasis is on heavy industry and on the many services to industry and the State, such as transport, farming, wholesale and retail distribution, public services, etc. The principles of time- and motion-study are always the same, but the approach may differ from one section of industry to another. There is daily proof that work-measurement can be applied to non-repetitive processes just as effectively as to mass-production, showing that work-study is now a universal "tool."

Application of Work-study

Every type of work has its own special problems, but the same basic means of overcoming them apply to all. For example, at one establishment, under incentive-bonus payments, a railway wagon is now unloaded by one man in half a day when previously this work was carried out by two men in a day. At another works, the task of handling billets, previously the responsibility of some six men using an expensive steam crane, is now accomplished by one man operating a fork-lift truck. In a further typical instance, the introduction of incentives in a machine-shop reduced the machining time of a certain component from nine to four hours, and in yet another case, incentives applied to a large maintenance department more than doubled productivity on a number of routine jobs. To prove that opportunities for substantial improvement are not confined to heavy industry, a number of case-histories are quoted in "Work-study in the West," recently published by the British Productivity Council. One example given relates to an office worker using a printing machine who now accomplishes in one day work which had formerly taken a week.

Thus, it will be seen that the order of potential gain is not 20, 30 or 40 per cent., but 200, 300 or 400 per cent., though these figures apply to individual jobs. The national problem still to be solved is how to broaden these token achievements to a point where they will strongly influence the overall competitive position relative to industries overseas. The number of firms and industries in Great Britain employing work-study is, in the writer's opinion, still all too small, and the case cited of the Belgian foundry (quoted in the introductory paragraph) should be both an example and a warning.

Basic Principles of Work-study

Much faster progress would be possible if some basic ideas of work-study were more widely understood and if the comparative ease with which it can be applied were more generally realized. It is surprising how much work is still performed on the basis that "the time for doing a job is whatever time it happens to take." It is a well-established fact that all mechanical and physical work, however complicated, can be timed (*i.e.*, measured) and the correct time for the job expressed in allowed minutes or hours. Hence, there is no longer any excuse for work to be performed on a *laissez-faire* basis and this method should be replaced by one requiring a planned and predetermined output for each working day.

Although work-measurement depends in part on the subjective judgement of time-study engineers, the standard time for the job—ascertained by proved methods—whilst never exact, is always within acceptable limits. If the standard time is one-half or one-third of the *laissez-faire* time, then a relatively large tolerance on the standard time is permissible, because the scale of bonus payments are "geared" to take account of inaccuracies inseparable from rough and heavy work.

Time-study being normally preceded by method-study and method improvement to get the procedure right before the correct time is determined, a requirement is fulfilled which was first laid down as necessary by Mr. F. W. Taylor, who said that "the greatest production results when each worker is given a definite task to be performed in a definite manner in a definite time."

Putting Work-study into Practice

The chief difference between the earlier practices of work-study and those applying to-day is that there is now a better awareness of practical issues. Of these practices, one of the most fundamental has a large psychological element and concerns the problem of translating precept into action. It is one thing to agree that work must be measured and controlled and another to bring to pass the changes in lifetime habits which this connotes.

Therefore, the first active proceeding upon which work-study relies is a frank and honest approach to the individual employee; there is abundant proof that, without this, success is unlikely. Higher productivity is an aim accepted by all, and there is no opposition to it in principle. When translated

into action, however, the chief obstacle to progress is found to be the almost immovable weight of long-established practices. Moreover, inertia is not confined to the rank and file, but permeates all levels to an almost equal degree.

Good industrial relations are the deep foundation of success and firms where joint consultation flourishes have been found to advance most rapidly with regard to the application of work-study. Full information about work-study, its aims and the intended means of attaining them, must be given to every employee. To tell the employees how it will effect them is valuable, but to explain the vital part each will have to play and how each will share in the benefits of higher productivity is better.

When introducing improvements for the first time, a modest beginning has been found best, starting on simple jobs carried out by two or three men for example. With the first bonus payments in the wage packets, accompanied by no ill effects, confidence is established and progress thereafter is limited only by the speed with which the work-study staff can cope with the demands for its services. Good personal-relations between work-study officers and operators are the key to progress and a willingness to discuss and explain at infinite length is the only sure basis of success.

Incentives and Work-flow

To ensure beyond doubt that the new level of performance is attained, some driving force is necessary and this can best be provided by incentives. The introduction of schemes of incentive bonus payments, based on work-measurement, is probably the most effective single measure available at the present time for raising productivity quickly and effectively. Measurement of work ensures the highest standards of performance and virtually the only expenses are the salaries of the trained staff who draw up the schemes. In some cases, the issue has been obscured by the impression, engendered as a result of superficial knowledge, that method improvement must in all cases precede incentives. Whilst method-study is an essential preliminary, it will be found that there is nothing inherently wrong with a great many industrial practices. What is needed is a means of ensuring that work is carried out efficiently in perhaps a fraction of the time hitherto considered normal.

Incentives are a powerful inducement to attaining peak-performance, but in themselves can only be partially effective. Unsupported by other measures, they sometimes merely unbalance the flow of work, without much compensating advantage. This leads to the realization of the part work-study can play as a comprehensive guide to reorganization and planning.

The fact that an improvement at one point can be nullified by non-action further down the line has led to a broadening of the application of work-study. Whilst mainly concerned with an immediate objective, it must inevitably proceed from the particular to the general, because its searching techniques carry it far beyond the official field of investigation—indicating the need for general control and reform.

Thus, whilst aiming at increased productivity by better methods and use of incentives, work-study must simultaneously draw attention to the need for better organization of work-flow. This can be achieved by surveys, detailed scheduling of jobs, planned maintenance and the like. Improvement will need to be made in the procurement of stores and control of stock levels and there must be speedier and improved methods of handling materials to support the increased tempo of work. Correct forecasts and accurate records of work done permit economical manning and reliable costing, and establish performance indices leading to the progressive reduction of causes of lost time. Detailed analysis will eliminate unnecessary movement and activities—in addition to unprofitable lines—and a labour policy of redeployment, retraining and control of recruitment may prove necessary; sales policy, too, may require overhaul.

Thus work-study, by its very nature, can be the mainspring of concerted action, leading to comprehensive systems of work control and planning. The resultant increase in productivity is far and away greater than could be achieved by application in isolated locations; quoted individual achievements—impressive though they may be—are often merely tokens having no appreciable effect on overall performance. Results become increasingly important when work-study is recognized as part of a combined operation and its stimulating effect in uncovering weaknesses is of outstanding value.

Rôle of Work-study

When properly used to furnish data on procedures and performances, work-study constitutes an indispensable service on which major decisions for increasing efficiency may be based safely, and there is no field of economic activity where this service cannot be applied. If the rôle of work-study is to assist in solving the complicated problems of better organization for higher productivity, then another ingredient of success is the calibre of the staffs engaged on these tasks.

The final condition of success is that of top-level support. The description of work-study as an advisory service to management is obviously only tenable if managements use that service. It is no criticism of managers, however, many of whom successfully "deliver the goods," that they can often see no compelling reason for change. Therefore, the responsibility for revolutionary decisions which are thought necessary, the repercussions which they will cause and the temporary setbacks which may ensue, can only rest on the shoulders of the chief executive of a firm. Because the formulation of these comprehensive plans requires time and specialized knowledge, there must be reliance on the considered recommendation of work-study staff, followed by discussion at all levels. *The successful introduction of work-study schemes of decisive importance depends on a two-way flow of ideas, with the full participation of all concerned.*

Blistering of Wet-process Vitreous Enamels on Cast Iron*

By E. R. Evans, A.I.M. and A. D. Morgan, A.M.I.B.F.

This paper deals with the problems confronting the enamellers of cast iron. Of the defects which can occur, the most serious is that of blistering. Varying in its degree of severity, the defect occurs on many enamelled castings and it has been claimed that the proportion of ware rejected for this defect fluctuates considerably without any apparent corresponding changes of foundry and enamelling-shop practice. Through one of its sub-committees, the British Cast Iron Research Association was asked to investigate the problem of blistering, mainly from the metallurgical angle, although it was understood that metallurgical and enamelling aspects could not be completely divorced from each other. Most of the work carried out concerned wet-process enamelling, since wet-process enamels are more susceptible to blistering than those applied by the dry process.

Checking the Skin Effect

Castings from the foundry are said to have a skin which, for successful vitreous enamelling, has to be adequately cleaned or removed by shotblasting, otherwise severe enamel blistering is likely to occur. With adequate cleaning, blistering is reduced but not necessarily eliminated. It could be argued that the casting skin is responsible for blistering, that shotblasting removes most of it and only slight blistering occurs and that if it can be completely removed, blistering will be eliminated.

In order to check this point, cast-iron plates were made and part of the surface of each was removed to various depths by grinding or machining. The plates were then enamelled and the enamel applied to the machined parts of the plates was compared with that on the unmachined part which had been given a normal shotblasting treatment. In order to take into account as many variations of process as reasonably possible, sets of plates were made by nine different foundries and some plates of each set were enamelled by each of six enamellers. All the foundries and enamel shops involved used their own normal procedures for making and processing the castings. Inspectors of each firm were asked to pass or reject each enamelled surface on the basis of severity of blistering and to comment on each plate:— (*a*) whether skin removal had decreased blistering, (*b*) whether skin removal had aggravated blistering, or (*c*) whether skin removal had made no apparent difference. The results for 425 plates so used are given in Table 1.

TABLE 1.—*Effect of Casting-skin Removal on Blistering.*

Observation.	No. of plates.
Skin not removed	Pass 185, reject 240
Skin removed	Pass 182, reject 243
Skin removal decreases blistering	128
Skin removal increases blistering	150
Skin removal has no effect	147

These tests show that the cause of blistering is not confined to the casting skin, since blistering can still occur when the casting skin has been removed for various depths up to about $\frac{1}{16}$ in. Although the casting skin is not primarily responsible for blistering, it is held to be important that the skin be as free from defects as possible and that shotblasting should be as effective as possible.

Summary and Conclusions

The Authors' most useful observations are set out in the final paragraphs of the paper under "Summary and Conclusions" and these are included in what follows:

Blistering in cast-iron wet-process vitreous enamels is a serious problem which must be overcome if the industry is to survive the threat of alternative materials. The defect can be minimized at any plant if sufficiently good control can be maintained of all foundry and enamel-shop operations; practices vary considerably in the industry often beyond the claimed limits. The casting skin is not necessarily responsible for blistering poviding it is sound, but surface and sub-surface defects, however, will cause isolated groups of blisters in many cases. The temperature cycles that castings undergo during the enamel-fusing operation are important and can affect the prevalence of blistering.

The gases responsible for the defect are oxides of carbon formed by interaction between graphite in the iron and oxides or oxygen originating from the atmosphere. The treatment of the casting prior to enamel fusing determines how much oxygen is available to the graphite for potential blister-gas formation. There is no intrinsic gas-content of cast iron which is in any way responsible for blistering. Annealing is a process which is unnecessary except as an aid to cleaning. The metallurgical effects of annealing on the iron have little significance and are more likely to promote blistering than to prevent it. This has

* Abstract of a paper presented to the Institute of Vitreous Enamellers and published in their *Bulletin*. The Authors are on the staff of the British Cast Iron Research Association.

Blistering of Vitreous Enamel

been illustrated by the study of gas evolution from cast-iron specimens.

Shotblasting is seldom adequately controlled in enamelling plants and yet this operation is probably the most important of all those concerned with the production of vitreous-enamelled iron castings. The rate of surface removal from a casting is dependent on size of grit, but is not a criterion of satisfactory surface preparation for cast iron. Coarse shot tends to damage the surface rather than clean it, thus surface oxides are merely peened into closer contact with graphite and become potential sources of gases causing blistering. Fine shot cleans better and damages the surface less and, in general, produces a better surface for the application of wet-process vitreous enamel.

Russian Literature on Welding of Castings

The preliminary contents lists issued by the British Welding Research Association (Abington Hall, Abington, near Cambridge) of Russian journals they are in the course of translating include the following titles of interest to founders:

From *Welding Production*—"Investigation of the Welding of Cast 15DKhGS Steel," by V. I. Klementov, and "Oxy-induction Cutting of Metal," by N. M. Varfolomeev (January, 1960); and "Current Carrier for Circumferential Welding of Pipes," by Yu. V. Rybakov (March, 1960). In *Automatic Welding*, "Cast-iron Pipes Resistance Welded," by Yu. V. Skul'skii (January, 1960); "Electrodes for Welding-up Casting Defects in 40KhL and 40GLSteels," by Yu. A. Moshenskii and N. N. Skrynskii (February, 1960), and "CO_2 Welding of 1Kh20N3G3D2L Steel and Welding-up of Casting Cavities in that Steel by the CO_2 Process," by N. I. Kakhovskii and A. M. Ponizovstev (March, 1960).

In a survey of the previous year's translations, the BWRA comment that another aspect which is particularly evident is the enthusiasm and earnestness of the Russian engineer, welder and technician, in submitting ideas and in giving full vent to criticisms both of other authors and of the journals themselves. Some of the information published is outdated by Western standards—it may even have been proved erroneous—but values must be based on overall technical and technological developments and even these articles have a distinct value as a stimulus to criticism and counteraction. There is a marked awareness by the Russians of their technical shortcomings and there is a powerful drive to overcome these.

Since publication of English translations began, there has been a continuously increasing call for them from many parts of the world, including the USA, Japan, the Commonwealth and Western Europe. However, results from the UK, while showing some increase, have been slow in comparison.

NEW 290-FT. dry dock designed for the repair of coasters and colliers was opened at Sunderland last week by Austin & Pickersgill, Limited. It replaces a 90-year-old wooden dry dock which was closed a year ago.

Cast-iron Bridge Panels

By C. J. Robb

Ornate date and other inscription panels to bridge parapets came into vogue in the middle of the last century. Some of these were simple in design, bearing the date of erection and the names of the engineer and contractors. Others were more ornamental and displayed some of the best of the founders' art. One of the first iron bridges in England of any considerable span was that erected over the river Wear at Sunderland by Rowland Burdon in 1796. It was indeed a monument in "cold" iron, but during a blasting operation in 1853 at the Bottle works at the south-west side of the bridge, one of the abutments was so

FIG. 1.—*Bridge-panel of the Wear bridge built to the plans of Robert Stephenson to replace that destroyed in* 1853. *The centre tee is a unique heraldic design in cast iron of corporate emblazon supporting an ornate gas-lamp. The names of the two engineers who bridged the river are empanelled and those of the contractors and founders are labelled.*

badly damaged by the blast that it was decided to build a new bridge. This was erected under the supervision and to the plans of the famous Robert Stephenson, C.E., by the eminent contractor Benjamin Lawton, the ironwork being executed by Hawks, Crawshay & Company of Gateshead. The total cost of the replacement bridge was £35,000, and the centre bridge-panel is shown in Fig. 1. The use of cast-iron bridge panels has continued even in this century and very many good examples can be seen all over the country.

TYNE MARINE FIRM of G. Lamb & Son, chain and anchor merchants, of South Shields, is closing down at the end of next month (after being in existence since 1798), because of the ill health of Mr. Alan Merriman, the proprietor.

Continental Appraisal of Light-alloy Castings*

By L. G. J. Van Ewijk

Over the past 20 years, much work has been done and many important advances have been achieved in the field of light alloys. Existing light alloys have been improved and several new alloys (magnesium alloys in particular) have become available. New production processes, such as Antioch (gypsum-sand), shell-moulding and low-pressure die-casting have been introduced, and new methods of controlling quality and production (spectrographic analysis, radiography, and penetrant die-inspection) have proved their value.

In addition to the aluminium alloys shown in Table 1, a number of magnesium alloys—several of them with remarkably good properties—have been added to the list of earlier compositions needed by the foundryman. Equivalent British and American specifications are included in Table 1, and typical compositions and properties are also given.

Aluminium Alloys

Out of the large number of aluminium alloys proposed in recent years, a group of typical foundry alloys has grown to be of major importance to the European metals industry. These may possess special characteristics such as:—appearance—finish, polish, colour, accuracy—tolerances, dimensional stability; machinability; resistance to corrosion (with or without protection); strength or strength/weight ratio; fatigue, and creep. With respect to strength, the magnesium-alloyed aluminium castings rank very high, especially those containing the higher percentages of magnesium. Aluminium casting alloys containing above 7 per cent. magnesium are increasingly sensitive to ageing, and since this ageing causes a severe loss of properties they are not suitable for long service at moderate temperatures. (No stabilizer is known as yet). In the foundry, these alloys—especially in the more complicated pieces—can be very difficult to feed and to control properly the directional freezing.

Of the other aluminium castings alloys, Silumin and Silumin γ are perhaps the most popular because of their excellent castability and suitability for the production of pressure-tight castings. In plasticity, Silumin approaches the Hydronaliums (see Table 1). The resistance to corrosion of the Silumins, though lower than that of the Al/Mg group, is good, and subsequently they are much used in marine applications.

Lo-Ex and 122 alloy (both piston alloys) resemble each other in strength, both showing a very low elongation, but this is no serious drawback for their principal use. Lo-ex is much in demand for its low thermal-expansion (about 19×10^{-6} per deg.C), and alloy 122 is known to be more resistant against attack by fatty acids, but these alloys are difficult to handle in the foundry. Y-alloy is in use for pistons and cylinder-heads and although its Brinell hardness is lower (about 120 for sand castings as against 135 to 145 for 122 alloy and Lo-ex), it has proved its value for applications demanding high performance.

Alloy D 8 (DTD 424) is a general-purpose alloy, much in use for applications where no heavy stresses occur. Its foundry behaviour is good and for high-dimensional stability, a stress-relieving heat-treatment is favoured. Alloy 304 is not an "easy performer" in the foundry—its strength and plasticity are of the same order as that of D 8.

* Abstracted from *Metal Progress*. Mr. Van Ewijk is consulting metallurgist at Wenum, Apeldoorn (Netherlands).

TABLE 1.—*Composition of Typical Aluminium Casting Alloys.*

Trade name.	Si	Mg	Mn	Cu	Ni	Tensile properties (tons per sq. in.). U.T.S.	Tensile properties (tons per sq. in.). 0.1 per cent. proof stress.	Elongation, per cent. on 4 in.	Equivalent specifications
Hydronalium ..	—	5 to 12	—	—	—	13.8	7.1	7	BS1490: LM10W (Mg 10 per cent.); ASTM G10A (Mg 10 per cent.): 220 alloy
Silumin (Alpax)	12	—	—	—	—	11.6	7.1	7	BS1490: LM6M; ASTM S12A
Silumin γ (Alpax γ)	12	0.5	0.5	—	—	15.2	11.6	3	BS1490: LM9WP
Lo-Ex	12	1.2	—	1	2.5	19.2	18.7	1	BS1490: LM13WP; ASTM SX122A
Y-alloy ..	—	1.5	—	4	2.1	17.8	15.2	2	BS1490: LM14WP; ASTM CN42A
DTD424 (D8) alloy	5	—	0.5	3	—	17.8	13.8	3	BS1490: LM4WP; ASTM SC8
298/304 alloy	—	—	—	4.5	—	17.0	13.4	2	BS1490: LM11WP; ASTM C4A
122 alloy ..	—	0.3	—	10	—	13.8	13.4	1	BS1490: LM12WP; ASTM CG100A

TABLE 2.—*Typical Magnesium Alloys, with and without Aluminium.*

Alloy type	Al	Zn	Mg	Zr	Tensile properties.		Elongation (per cent.) on 4 in.
					U.T.S.	0.1 per cent. proof stress.	
Al Zn	8—10	0.50—1.0	Bal	—	13.8—16.1	5.8—6.3	2—10
5 per cent. Zn Zr ..	—	5.0	*	0.50	15.6—17.8	8.9—9.4	5—10

* Thorium and rare earths.

but its impact resistance is better and can surpass even that of Silumin if heat-treated correctly.

Magnesium Alloys

The magnesium alloys (Table 2) are grouped according to the absence or the presence of aluminium as an alloying element. Those containing 8 per cent. aluminium are the "older members of the family" and are used a good deal in Europe although perhaps not as much as in the US. The tensile properties compared with the newer aluminium-free alloys are good and the impact resistance is high. A 10 per cent. die-casting alloy is suitable for general-purposes. Its strength and ductility are good, but its toughness is rather poor. However, with care, it is suitable for pressure-tight castings. The newer aluminium-free alloys show several remarkable advances in the metallurgy of light alloys. In missiles and aircraft usage, their high damping capacity, superior compressive yield-strength and high specific heat are of great advantage. At the head of the list is Z5Z (5 per cent. zinc and 0.50 per cent. zirconium)—the first new alloy to offer a considerably higher proof-stress and at the same time, being much less prone to micro-porosity. European foundrymen soon became familiar with the very special techniques the alloy requires in melting and refining and appreciated the quality that could then be obtained.

An alloy containing zirconium and thorium is the strongest of the "Elektron/magnesium" alloys and is weldable while Z5Z is not. One of the magnesium alloys with 2½ per cent. thorium offers a combination of several valuable characteristics, the most important of these being the high creep-resistance up to 325 or 350 deg. C.

At the conclusion of his article, the Author makes a plea for co-operation between designer and foundryman and predicts that the demand for light-alloy castings will increase in the coming years.

Contracts for Drakelow

Contracts totalling some £15,000,000 are to be placed by the Central Electricity Generating Board for two large super-critical pressure generating units to be installed at Drakelow C power-station, near Burton-on-Trent. They will be the first of their kind in Britain.

One boiler is to be built by Babcock & Wilcox, Limited, Renfrew, and the other by International Combustion, Limited, Derby, and the turbo-alternators by Associated Electrical Industries, Limited, and the English Electric Company, Limited, respectively.

Each generating unit will have an output of 375,000 kw. (50,000 h.p.) from a single shaft machine. At full load each boiler will consume about 150 tons of pulverized coal per hour. Although the cost of the units is slightly higher than that of similar size sub-critical units they will generate electricity at a lower cost so counterbalancing the extra capital charges.

Iron and Steel Engineers' Meeting

The forty-first meeting of the iron and steel engineers' group of the Iron and Steel Institute is to be held in Scunthorpe from Monday to Thursday, October 24 to 27. The programme will include technical sessions at which papers on developments at the Appleby-Frodingham Steel Company, lighting in the iron and steel industry, failures in a blooming mill, and re-developing an integrated iron-and steelworks, will be presented and discussed. There will also be visits to the works of Appleby-Frodingham, John Lysaght's Scunthorpe Works, Limited, and Richard Thomas & Baldwins, Limited. Full details of the programme may be obtained from the secretary of the Institute, at 4, Grosvenor Gardens, London, S.W.1.

Malcolm & Allan Amalgamation

The business of Malcolm & Allan (London), Limited, and Cable Jointers, Limited, have amalgamated under one management. They are now operating from 229, High Street, Acton, London, W.3 (telephone ACOrn 7811). Both are companies in the Metal Industries, Limited, group. Mr. E. J. Daws is now managing director of the two companies, which still retain their own names and serve their own particular branches of industry.

The companies between them cover the whole field of electrical contracts, cable jointing, wiring, overhead lines and complete industrial schemes. The integration is designed to broaden the activities of the two concerns and to develop to the point of establishing branches in the provinces.

Broken Hill Profits climb

A record group net profit was made by Broken Hill Proprietary Company, Limited, the Australian coal owners and iron and steel producers, in the year ended May 31, 1960. The net profit of £A13,716,000 was £3,500,000 more than in 1959 and was struck after providing more than £11,500,000 for depreciation, over £12,000,000 for tax, and more than £7,000,000 for plant replacement.

With the £7,000,000 addition, the provision for increased cost plant replacement is now £28,175,000. The appropriation for mining and development is raised from £1,200,000 to £3,750,000 and the dividend is increased from 8¼ per cent. to 8¾ per cent. on increased capital.

Equipment and Supplies

Pocket Graticule and Magnifier

Graticules, Limited, Bath House, 57/60 Holborn Viaduct, London, E.C.1, have designed a pocket magnifier with built-in graticule, which when folded measures about 2 in. by 1½ in. It has been designed mainly to fill the gap between rough estimation with a scale and precise measurement with elaborate instruments, and it could be useful in foundries of all types.

The micrometer, (Fig. 1) which is on glass, is mounted in the base of a low-powered folding magnifier, the whole frame being made of aluminium, cut away to give maximum visibility, the field of view being 1 in. square. The micrometer scale when used, is placed in close contact with the object to be measured or viewed and the scale shows up well against a wide variety of colours, whilst the graduations are sufficiently fine to ensure a reading accuracy of ± 0.002 in. A wide variety of graticule patterns is available.

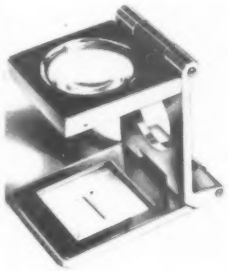


FIG. 1.—*Pocket magnifier and graticule produced by Graticules, Limited.*

Nickel-carbonyl Patternmaking

A new patternmaking process developed in the United States, called the nickel-carbonyl metal process, is claimed to eliminate the costly machining and hand finishing usually associated with the manufacture of foundry patterns, dies, moulds, and other products from master models. It consists basically of a metal-deposition technique that is completely independent of the complexity of the master model being reproduced. It is said to be inherently faster, more accurate, and subject to far less manufacturing errors than conventional techniques. The actual duplicate produced by the carbonyl process is made of pure nickel that wears well, lasting longer than some conventional duplicates now being used, the report adds. The carbonyl process is based on the use of nickel carbonyl—an ether-like liquid (which is highly toxic and can be explosive in character) and this is made to decompose into pure, free nickel and carbon monoxide, by subjecting it to temperatures above 280 deg. F. (150 deg. C.).

The Process

The process consists of making a mould of the master model and then depositing carbonyl nickel on the mould to form, after decomposition, a pure-nickel shell that is an exact reproduction of the master model. The manufacture of a nickel-carbonyl duplicate begins with a careful checking of a master pattern against the engineering drawings. After being treated with a release agent, the model is first sprayed with a special eutectic alloy. The alloy is built up to a thickness required to form a sturdy "mould" of the master model.

The mould is then removed from the master and inspected for any imperfections or damage resulting from this operation. Then it is placed in a deposition chamber, where the actual carbonyl depositing process later takes place. Several different moulds can be processed in the chamber at the same time. The chamber is then sealed and the atmosphere within it is replaced with inert carbon dioxide. Moulds are heated to 165-175 deg. C., well above the decomposition temperature of the nickel carbonyl.

At this point nickel carbonyl gas is introduced into the chamber. The gas immediately decomposes into pure nickel and carbon monoxide, the nickel being deposited on the heated surface of the mould, the thickness being directly proportional to time, normally from 0.050 to 0.400-in. When the desired thickness has been reached, the flow of gas is stopped, the chamber purged, and the mould removed. The mould is then stripped from the nickel shell.

After careful inspection, the nickel shell is supplied to the customer, in that form, or it may be filled with a suitable backing material, such as a castable resin. A steel support is usually added to the filled shell for mounting fixtures or lifting bolts.

Properties

Nickel-carbonyl products have extremely fine grain-structure, are smooth and are said to have excellent drawing properties, high abrasion resistance, and non-adhesion properties; the material has virtually no porosity and actually becomes brighter and smoother in use, qualities which it is reported, confer excellent drawing properties on patterns, with minimum use of release agents with most types of sand and sand binders.

When used in conjunction with shell-moulding and coremaking, it is claimed that nickel-carbonyl patterns have excellent resistance to heat-checking, good heat conduction and that uniformity of temperature provides faster, and more uniform curing; the patterns will operate at 260-290 deg. C. without distortion or chemical reaction and the material is resistant to thermal-shock up to 870 deg. C. The new process is the result of work carried out by the Budd Company, of Philadelphia 32, Pa., U.S.A.

Fire-pump Set

The introduction of a new independent fire-pump set for marine and general fire-fighting duties is announced by Goodyear Pumps, Limited, 44, Brook Street, London, W.1, a member of the Holman group, Camborne (Cornwall). The new fire pump which is approved by the Ministry of Transport and complies with "Safety of Life at Sea" Regulations, combines a Goodyear A.12 positive displacement rubber-to-metal pump and a Petter AVA.2 air-cooled diesel engine (10 b.h.p.) to form a reliable, compact, efficient, and portable set it is claimed.

Operating Data

At a shaft speed of 1,800 r.p.m., the pump has an output of approximately 5,000 gal. per hr. Said to deliver easily two jets of water of over 60 ft. through ¾-in. nozzles and two 40-ft. jets through ⅝-in. nozzles, for its duties the pump can operate with heads up to 150 ft. and with suction lifts of 27 ft. The fact that the pump is self-priming is an important consideration, and the deep suction lift enables it to be installed in positions where operation at considerable depth is unavoidable.

The pump and diesel engine are mounted on a fabricated channel-steel bed-plate and the pump is driven through a centrifugal clutch coupling. The complete unit is 52 in. long, 19 in. wide, and 38 in. high, and its weight, complete with by-pass relief valve, is approximately 750 lb.

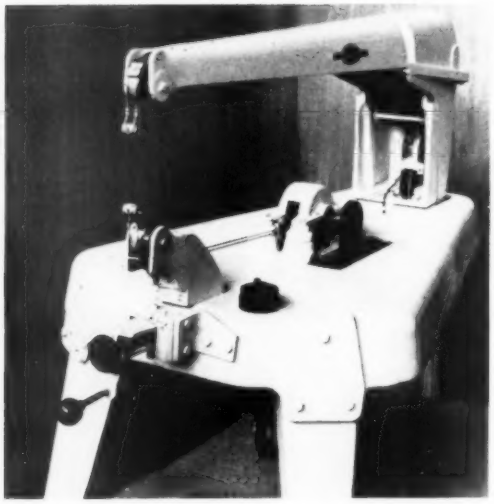


FIG. 2.—*New type of jigsawing machine produced by Hobbies, Limited, Dereham, Norfolk.*

Jigsaw Machine

Hobbies, Limited, Dereham, Norfolk, announce the availability of a new type of jigsawing machine known as the "Master" model. The new machine (Fig. 2), which will take the many types of blade that are now on the market, runs at the full motor speed of 1,400 revs./strokes per min. The saw blade forms part of a closed circuit of rectangular form, the horizontal length of the rectangle being upwards of three feet. At the four corners of the rectangle, roller bearings and suitable fittings provide for free up-and-down movement of the saw. In this machine, the conversion of circular motion into reciprocating motion is produced by two opposing connections in tension, pulling alternately. Tension of the saw blade itself is effected and released by the top arm of the frame being hinged on trunnion pins at the back and the mechanism is such that the machine does not have to be stopped while the saw tension is corrected to suit the work in hand. The new unit is claimed to be well adapted to meet the need for quiet high-speed running, the reciprocating weight being reduced to a minimum.

The machine is built to take a ¼-h.p. motor. With a 3-ft. throat, it will cut to the centre of a 6-ft. circle, yet will also cut sideways, *i.e.*, it will cut down the centre of material 6-ft. wide. The makers claim that new fields of usefulness are open to the "Master" machine because of its large dimensional capacity, high speed and power, and ability to make internal cuts. The machine stands independently on the floor, occupies little height above the worktable, and uses blades which are readily available.

Taccy Duster: For a new painter's "Taccy Duster" that is being introduced by Anti-Dust Services Limited, it is claimed that it will remove dust from newly-painted areas without smearing the paint, its chief quality being that it absorbs the dust. Details of the material are available from the company, by writing to P.O. Box 28, Dudley, Worcester.

Lighting of Coke: Research workers at the Department of Fuel Technology and Chemical Engineering at Sheffield University claim to have invented an appliance to light coke without causing smoke, which should shortly be on the market. It uses kerosene and a small electric fan to produce a blow-lamp type of flame. Research was started after it had been learned from the Clean Air Council for Scotland 15 months ago that many districts in Scotland were without gas. It is understood that the appliance has been placed in the hands of a manufacturer. The final model of a domestic stove, invented and designed by Professor M. W. Thring, head of the Department, and which has been developed to burn coal almost smokelessly, is expected to be available in the autumn.

Oxy-acetylene Cutting Nozzles: British Oxygen Gases, Limited, have announced a range of oxy-acetylene nozzles which have been developed for machine cutting applications and are an addition to the "Saffire" range of equipment. It is claimed that they are capable of cutting 7-in.-thick plate at 45 ft. per hr. and 1-in. plate at 100 ft. per hr. They are available in four sizes: 45, 50, 60 and 73—numbers which indicate the diameter of the throat passages in thousandths of an inch.

Fire Extinguisher: The introduction of a leak-proof, strike-knob, 5-lb. carbon-dioxide capacity fire-extinguisher, Model 1505, complementary to the 10-lb. extinguisher, model 1510, is announced by Nu-Swift, Limited, Elland, Yorkshire. Mainly intended for fighting inflammable-liquid fires, and those involving electrical equipment indoors, the extinguisher has a mean range in still air of 11 ft., the carbon dioxide being expelled through a novel type of discharge diffuser. The extinguisher, which is operated in the upright position, weighs only 19½ lb.

CO_2 Breakdown Agent. The Distillers Company, Limited, have issued an information sheet covering their recently-developed breakdown agent for CO_2-bonded foundry sands. Samples of "Frecor," the new product, are now being prepared and will be available from the firm's regional sales offices at either Queens House, Queen Street, Manchester 2, or Broadway House, The Broadway, Wimbledon, London, S.W.19.

Electric Motors: Brook Motors, Limited, Empress Works, Huddersfield, announce that their range of British standard drip-proof motors can now be supplied with epoxy-resin encapsulation of the end-windings and slots. This treatment, it is reported, prevents moisture, oil grit, chemical fumes, etc., from entering the windings, and is particularly useful where humid conditions apply.

Mobile Laboratory for X-ray Inspection: B.I.X., Limited, Hanover House, 73, High Holborn, London, W.C.1, announce that they now have in service a fully-mobile laboratory for radiographic inspection. Equipped with portable X-ray equipment, radio-active isotopes, up-to-date darkroom facilities and manned by skilled operators, the laboratory offers service on site, even, it is said, under the most difficult conditions.

Extractor for Ball- and Roller-bearings: A new and streamlined system—known as Tracta—for ball- and roller-bearing extraction has been developed in Holland and is being marketed in this country by G. E. Simm (Engineering), Limited, 27, Broomgrove Road, Sheffield, 10

American Letter

Production of Aluminium Castings at Chevrolet, USA*

Chevrolet built its own foundry at Massena in New York State on the St. Lawrence River and the border of Canada, to consume raw aluminium at the rate of 35,000 tons a year. The company is the largest single customer of the nearby Reynolds Metals Company's reduction works. The foundations for the foundry were laid in October, 1957, and modern plant installed. To-day, the foundry is able to produce aluminium castings, not only by conventional methods, but also by die-casting (pressure-die-casting), conventional permanent-mould (gravity-die) castings, and low-pressure die-casting. The latter is relatively new to the US (see JOURNAL, August 11, 1960). Molten aluminium from the Reynolds works, less than a mile away, is brought to the foundry on road vehicles, each bearing two covered ladles of the hot metal, each load approximating to about 7½ tons of aluminium. Cranes are employed to empty the aluminium into holding furnaces where it is retained until use. The metal as received approximates to alloy-356 (nominally, 7 per cent. Si. and 0.30 per cent Mg). Actual alloying to specification by adding magnesium, titanium/boron, manganese, etc., is carried out at the foundry before casting. Parts which are pressure-die-cast include flywheel housings, crankcase covers, idler brackets, and clutch housings for automatic transmissions. Permanent-mould (gravity-die) castings are confined to pistons and camshaft gears. The low-pressure process is used in the production of left and right crankcases, gearbox housings and cylinder-heads.

The plant turned out its first aluminium castings in May, 1959, and to-day, some 13 months' later, the foundry is shipping castings at a rate of nine carloads and two auto-truck loads a week, and over the same period, has shipped well over 12,500 tons to other plants. Castings are supplied to Chevrolet's big engine plant at Tonawanda, near Buffalo. At Tonawanda, one of the longest engine assembly lines in the automobile industry was put together. The first line of machinery was installed by May, 1959, and the first production-built engine came off in June. Since then, more than 224,000 complete Corvair power-plants have been shipped. After the castings are received from Massena, they are milled to provide locating surfaces. Then they are drilled, reamed, finish-bored and tapped, washed in hot water and detergent solution, and next move to the assembly line.

Furnace for Casting Refractory Metals

Development of the first large helium-cooled vacuum arc-melting furnace intended for recovery of titanium scrap, has been announced by National Research Corporation of Cambridge, Massachusetts. Features of the furnace include: (1) Arc melting of the initial crucible-charge under an argon atmosphere using four permanent thoriated tungsten electrodes. (2) Insertion of additional charge metal in 50- to 100-lb. lots, as needed, through a charging unit during the argon-filled portion of the cycle, and (3) consumable arc-melting under vacuum for removal of hydrogen and other dissolved gases which do not form stable compounds with the metal. A helium-gas cooling-system replaces the more-conventional and more-hazardous water-cooling normally employed. Titanium, for example, would react explosively with water in the event of a mechanical failure inside the furnace jacket, such as a ruptured pipe.

Single casts of titanium, up to 550 lb. have been demonstrated and company engineers are confident that 800-lb. casts can be achieved with the present unit. Other reactive and refractory metals which appear promising for alloying and casting development include columbium, tantalum, molybdenum and tungsten. The National Research Corporation hopes to use the furnace as a pilot plant for new melting techniques and for investigating the melting and casting of other refractory and reactive metals and alloys.

Gas-turbine Engine

The International Nickel Company of Canada, Limited, have recently installed a regenerative gas-turbine engine in a truck used for hauling ore from the company's mine in the Sudbury District of Ontario. This is the first time that an automotive gas-turbine engine has been subjected to the rugged requirements of ore hauling. Called the GMT-305 Whirlfire, the turbine engine was manufactured by the Allison Division of General Motors Corporation, Indianapolis, Indiana. The engine, of 225 h.p., is a multi-fuel engine with more than double the power of a comparable piston engine per unit volume and approximately 70 per cent. more power per lb. The turbine-powered truck travels almost two miles over a road winding upward at an 8 per cent. gradient around the inside of the mine before reaching the surface with its load of 32 tons of ore. For the gasifier and power turbine-rotor assemblies, nickel-containing alloys are used in the blades (GMR-235, a heat-resistant cast alloy of 63 per cent. nickel, 15 per cent. chromium and 6 per cent. molybdenum). Castings of SAE 60347, a heat-resistant iron-base alloy of 10.5 per cent. nickel and 18 per cent. chromium, are used in the transition-liner support, turbine casing, engine bulkhead and extensions, and the nozzle support and casing.

In addition to this gas turbine, General Motors is at present manufacturing prototype engines for use in a highway tractor, a 28-ft. passenger boat, an amphibious lighter, a military track-laying vehicle and an earth-moving tractor. Other possible turbine-engine applications are reported to include locomotives, mine-sweepers and standby stationary electric-power plants.

Recovery of Nickel

The recovery of nickel from non-ferrous scrap in the US totalled 9,400 short tons in 1959—an increase of 27 per cent. over the 7,400 tons recovered in 1958, according to the Bureau of Mines. (Recovery of nickel from ferrous scrap is not included). Consumption of non-ferrous nickel scrap increased 78 per cent. to 13,900 tons, compared with 7,800 tons in 1958. The increase was largely responsible for the rise in secondary-nickel recovery, although there was also a considerable increase in consumption of nickel-silver scrap. Data on the consumption of nickel scrap in the US during 1959 follow (figures in short tons).

	Smelters	*Foundries and others*	*Total*
Scrap nickel	1,096	3,145	4,241
Monel metal	1,593	626	2,219
Misc. nickel	5,761	253	6,014
Residues	45	1,381	1,426
Total	8,495	5,405	13,900
Nickel silver*	3,058	7,885	10,943

* Abstracted from an article by Karl Rannells, *Am. Metal Market*.

† Excluded from the totals because it is copper-base scrap, although containing 10 to 20 per cent. nickel.

American Letter

Machine-tool Exposition

The (American) Machine-tool Exposition will be held in the International Ampitheatre, Chicago, from September 6 to 16, under the auspices of the National Machine Tool Builders' Association. This will be the first such exposition since 1955, and it is stated that more than 130 US machine-tool companies will exhibit more than 1,000 of their latest models. The display will require 12 acres of floor-space and will reflect the rapid advances made since the last exposition in the art of removing and shaping metal, application of numerical controls, development of accuracy, and the shift from operator control to automatic control. It is anticipated that the exposition may well "touch off" a new wave of plant modernization throughout the country's metalworking industry.

Tunnel Components and Equipment in Canada

Canada Iron Foundries, Limited, is nearing completion of six enormous tunnelling shields—the first to be designed and built in Canada—for the underground operations of the Toronto Transit Commission's new subway. The tunnelling shields are large steel cylinders inside which miners excavate with pneumatic power-tools, being protected by an overhead hood. When a space about 2-ft. deep has been excavated, the shield is moved forward by its own hydraulic jacks into the space. As it is being manipulated forward, the shield lays a continuous tunnel of cast-iron tunnel-lining segments behind it. Immediately after the liners have been erected, fast-setting cement grout is forced into the area between the linings and the earth to prevent movement of the soil.

Canada Iron Foundries is manufacturing the liners—52,000 of them, weighing 21,000 tons—at its Toronto plant. The design work and engineering for the shields was carried out by W. S. Atkins & Associates, Toronto consulting engineers, and the British firm of Mott, Hay & Anderson. Manufacture and supply of hydraulic equipment was handled by Tangyes, of Canada, Limited.

Aluminium-alloy Price Increase. The Aluminium Company of America announced on August 1 that it was increasing the prices of certain grades and sizes of aluminium ingot. Mr. L. P. Favorite, vice-president of Alcoa said the price increases would become effective as from that date. He emphasized that the increase of 1 cent per lb. in ingot price applied to alloyed ingot and that no increase at this time was being made in the base price of primary aluminium (standard 99.9 per cent. grade).

Capitol Dome. Ten tons of type-304 corrosion-resistant stainless-steel of sheet, plate and bar stock may be employed to extend the life of the Capitol dome in Washington another century. The original dome, of cast iron, was completed in 1861, in the early days of the Civil War.

WILLIAM BLYTHE & COMPANY, LIMITED—Mr. F. Parkinson has joined the board.

MASSEY-FERGUSON, LIMITED—Mr. C. F. Herrmeyer and Mr. R. W. Main have resigned from the board.

UNITED GAS INDUSTRIES, LIMITED—Mr. D. M. Robinson has been appointed managing director and director responsible for group production. Mr. N. L. Smith will continue as deputy chairman responsible for group sales and Sir Donald Perrott has joined the board as a part-time director.

Difficulties in Exporting

Mr. Macmillan's description of exporting as "fun" came under fire in an editorial in the August issue of *The Director*, which states: "When it comes to matters of trade, the gap between political and industrial thinking is as wide as ever it was."

Recalling the Prime Minister's recent talk on exports to a Church House conference of industrialists, *The Director* says: "Fun? How many people really enjoy the experience of spending weeks away from home, often in uncomfortable conditions, only to find on their return that what looked like an order-producing trip had turned sour because the Germans or the Japanese had stepped in with better credit terms?

"And when later the Revenue attempts to assess the weary traveller on the money he is alleged to have saved through his absence abroad, is it so surprising," the *Director* asks, "that he begins to doubt whether it is all worth while?" Far from being fun, exporting was laborious, expensive and risky.

The journal adds: "Certainly, we could sell more abroad and the need to do so is arithmetically obvious. Certainly industry and government can work together to achieve success—the Dollar Exports Council is a classic example of such co-operation. But equally certainly they will only work together successfully in what Mr. Macmillan has called the 'export game' when both members of the team are playing with the same set of rules."

Glenfield & Kennedy sells Compressor Subsidiary

Compressor business of Alley & MacLellan (Polmadie), Limited, a subsidiary of Glenfield & Kennedy Holdings, Limited, has been acquired by G. & J. Weir, Limited, the Glasgow engineers and founders. Within the next six months the production of Alley units will be transferred to Weir's Cathcart works. All the fixed assets at Polmadie, comprising land, buildings, and plant, have been purchased by Davy & United Engineering Company, Limited, so that it may improve its productive capacity in Scotland.

Glenfield & Kennedy states that, arising from the two transactions, it expects to realize from its investment in the subsidiary a sum in cash "approaching the value of the total net assets appearing in the subsidiary company's balance-sheet at December 31, 1959."

Low-pressure Die-casting

Wild-Barfield Electric Furnaces, Limited, have written that there are one or two points in the article printed under the above title in the JOURNAL of August 11, that are likely to give readers a misleading impression. In brief, these are as follows: On page 164, Fig. 2, the equipments shown are, in fact, holding furnaces, though in some circumstances they could be used for melting. Such an application as the latter, however, would not be carried out with fixtures for low-pressure die-casting in position. Page 169, Fig. 10, features a Wild-Barfield "ACE" sealed-quench furnace of the straight-through variety and not a Ballard camel-back oven as stated in the caption.

The same firm also point out that since the information quoted in the footnote on page 170 was collected, the number of 700-lb. furnaces originally exported was increased to 28 (of value nearly $300,000) and that number has now been augmented to more than 30.

Apologies are made to the firms concerned and to readers for these inaccuracies.

Health when Shell-moulding

A paper entitled "Occupational Health Studies of the Shell-moulding Process," by G. E. Tubich, B.S., Irving H. Davis, B.S., and Bernard D. Bloomfield, M.S., was presented at the twenty-first annual meeting of the American Conference of Governmental Industrial Hygienists. It opens with an excellent description of the shell-moulding process, which is highly developed both in America and in this country. In the USA the consumption of resin this year will be of the order of 19,600 tons. The paper covers studies made in seven foundries, four of which are highly mechanized and three are partially mechanized. The Authors insist that though shell moulding uses 80 per cent. less sand, there is no reduction in the amount of dust generated, because sand in the dry state is used in all steps of the process and (in America) there is a lack of adequate dust-control measures. As a result of these fairly-large-scale tests the Authors make the following recommendations:—

(1) Provision of local exhaust ventilation for sand-conditioning, shell-moulding, shell-curing and sticking, pouring and shake-out procedures, should be made.

(2) Local exhaust ventilation based on solvent-vapour control at sand conditioning where alcohol-resin mixtures are employed is necessary.

(3) A safe diluent for silicone parting compounds should be selected.

(4) The establishment of a good housekeeping programme would help prevent the accumulation of combustible dust.

(5) For effective control of dermatitis a programme on the following lines should be initiated. (*a*) All employees and particularly those who come in contact with powdered or liquid resins should practice strict personal hygiene. Readily accessible washing facilities should be provided to facilitate this practice. (*b*) Effective ventilation systems should be provided to minimize skin contact with the resin dust and vapours at all operations, including the curing or bonding operations. (*c*) For personal protection against the resin dust and vapours, cotton gloves and sleeves and water-repellent barrier-creams should be provided. (*d*) Workmen with active dermatitis should be removed from resin exposure and should be referred to a physician for treatment. After complete recovery these men may be reassigned to the area providing proper protective devices are utilized. They should then be observed carefully for sensitivity reactions and should be removed immediately when indications of this reaction exist.

Much information is given in the paper as to the fire-hazard associated with shell-moulding which is apparently not realized in this country. It is reported that dust accumulation in one American foundry caused an explosion because maintenance men working overhead in an area of sand conditioning and shell moulding disturbed a three-year accumulation of resin-sand dust in the rafters; the dust cloud was ignited by the gas flame in the shell-curing ovens. The practice of blowing down dust with compressed air may create explosive dust clouds, and removal of this accumulated dust by vacuum is strongly recommended.

The Authors have summarized their findings abount the foundries in the following statement:—

The shell-moulding process does not reduce dust concentrations in the foundry environment. Forty-five per cent. of the dust concentrations exceeded 20,000,000 particles per cu. ft. of air.

Free-silica content of moulding materials and air-borne dust and the particle size are similar in both shell-moulding and conventional foundry operations.

A potential explosion hazard is present during sand conditioning with alcohol/resin mixtures and from the accumulation on building structure of dust containing a high percentage of combustible resin material.

The silicone parting compounds are furnished with a wide variety of diluents, some of which possess toxic properties.

Significant quantities of carbon monoxide are present during pouring and shake-out operations. Phenols, aldehydes, and ammonia are not a major health problem.

A significant percentage of the employees contract dermatitis from the resin.

ECSC Steel and Coal Investments

In the first four months of this year, says the High Authority of the European Coal and Steel Community, investments of a greater total value than for the whole of last year have been registered with the ECSC executive. This highest-ever record totals $733,000,000 for coal and ferrous metals investments (excluding iron ore), compared with $662,000,000 for the whole of last year. The figure is split into $106,000,000 for coal and $627,000,000 for iron and steel.

Of the coal investments registered over the four-month period, some 70 per cent. were for colliery plants and 20 per cent. for coking plants. Of the ferrous metal investments, 19.8 per cent. were for pig-iron units, 11.1 per cent. for raw steel units, 54.6 per cent. for rolling plant and 14.5 per cent. for power and miscellaneous plant.

Continuing favourable conditions in the steel market in Europe is seen in the estimates for the third quarter of this year of the High Authority of the ECSC. Raw steel production is expected to reach 18,100,000 *tonnes*, against 17,830,000 *tonnes* in the second quarter and 18,200,000 *tonnes* in the first quarter of the year. Raw steel consumption is set at about 15,200,000 *tonnes*, exports at 3,300,000 *tonnes*, and imports at 400,000 *tonnes*.

Pig-iron output in the third quarter is estimated to be around 13,800,000 *tonnes*, and the steelworks' consumption of pig-iron is expected to be about 710 kg. per *tonne*, against only 700 kg. in the first 1960 quarter. Scrap consumption per ton of steel is estimated as only 395 kg., compared with 405 kg. in the first quarter of 1960 and 400 kg. a year ago. An estimated 7,900,000 *tonnes* of scrap will be needed, about 350,000 *tonnes* of which will have to be imported. Iron ore production in ECSC in the period is put at 6,700,000 *tonnes* and imported iron ore needs at 4,400,000 *tonnes*.

Translation Service

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

1645 "TEN YEARS OF THE COKE-QUALITY AGREEMENT. ITS SIGNIFICANCE FOR COKE-OVEN AND BLAST-FURNACE OPERATION." Dickens, P., and W. Radmacher. *Stahl. u. Eisen*, 1960, Feb. 4, pp. 129-136. (£5.) The coke convention between the coke producer and the iron industry was intended to raise the quality of the coke for blast furnaces. Certain standards were laid down and any deviation from these was expressed in the price of the coke. This convention has been in operation for the 10 years and has led to a noticeable increase in coke quality and in turn to easier blast-furnace operation. (Abstract *JISI*.)

1671 "DEVELOPMENT OF MODIFIED 12 PER CENT. CR STEELS FOR FORGINGS AND CASTINGS IN STEAM TURBINES." Koutsky, J. *Hutnické Listy* (Prague), 1959 (12), pp. 1105-1107. (£5.) Effect of tempering on the microstructure and mechanical properties. Effect of long-term heating on the microstructure and mechanical properties. Thermochemical analysis of the precipitation of carbides from the martensite and ferrite. Results of X-ray analysis of the quenched and tempered, and heated specimens. Heat-resisting properties of the steels investigated. Heat-resistant properties. Brittleness at operational temperatures. Mechanical properties at high temperatures. Stress relaxation test results. (Contents List.)

1745 "DEVELOPMENT OF SCRAP-IRON QUANTITIES AND PRICES IN THE EUROPEAN COAL AND STEEL COMMUNITY." Güldner, W. A. *Stahl u. Eisen*, 1960, Jan. 21, pp. 90-101. (£6 5s.) It has been stated how and where the recent scrap shortages occurred and how they were eliminated. The differences in the demand and supply structure of the Montan Union countries have been explained and economic facts concerning works groups using the same production plants have been published. A survey of the conditions in the United States emphasises that no long-term disadvantages need be feared, but that temporary shortages owing to the scrap return situation cannot always be avoided. An American price quotient graph has been applied to European conditions and this could lead to a better understanding of future market trends. (Author's summary.)

1746 "MAINS NETWORK DISTURBANCES BY ARC FURNACES." Walter, F. *Elektrotechnik*, 1948, August, pp. 217-220. (£4.)

1776 "INCREASED ECONOMY BY THE USE OF PRECISION CASTINGS." Nickel, E. G. *Industrie-Anzeiger*, 1960, *82*, May 10. (£4 10s.) A review of the principles in the design and production of precision-cast parts is given. Tolerances are discussed but it is pointed out that surfaces of working parts will in any case require some finishing treatment. Perfection standards must be adjusted to a level where the reduced number of rejects is offset by cost of machining on other processes. Various parts are shown and a list of suitable materials is included.

1790 "CONTRIBUTION TO THE INVESTIGATION OF PRESSURE LOSSES IN PNEUMATIC HANDLING SYSTEMS" (with special reference to the influence of friction and weight of the material dealt with). Hahnemann, H. W. *V.D.I.Z.*, 1960, Feb. 1, pp. 131-132. (£2.)

Translations in course of preparation include:

1827 "RADIOACTIVE-MARKING TECHNIQUE IN THE INVESTIGATION OF METALLURGICAL PHENOMENA IN STEELWORKS." Propstl, G. H. *Stahl u. Eisen*, 1960, June 23, pp. 863-877.

1828 "DETERMINATION OF SMALL BORON CONTENTS IN STEEL." Leeb, A. J., and F. Hecht. *Radex Rund.*, 1960 (1), pp. 62-66.

1833 "CONTRIBUTION TO THE PROBLEM OF THE LIFE OF STEEL MOULDS FOR CENTRIFUGAL CASTING." Bühler, H. *Stahl u. Eisen*, 1959, Nov. 12, pp. 1722-1730.

1834 "INVESTIGATIONS ON THE LIFE OF STEEL MOULDS FOR CENTRIFUGAL CASTING." Königer, A., and W. Liebmann. *Stahl u. Eisen*, 1959, Nov. 12, pp. 1730-1742.

1842 "MOULDED STRUCTURAL STEEL FOR PRESSURE-CASTING TOOLS AND MOULDS." Hiller, H. *Giesserei*, 1957, Mar. 14, pp. 141-149.

1843 "IRON AND STEELWORKS AT ROURKELA IN INDIA." Heinrich, H. *Stahl u. Eisen*, 1960, Feb. 18, pp. 197-206.

Other Translations

In the following translations the initials ACSIL, etc., stand for the organization to which enquiries should be sent, the addresses are given at the end of the list.

"VAPOUR-COOLING SYSTEM FOR CUPOLAS." Andonev, S. M., O. V. Filipev, and Y. A. Radionova. *Lit. Proizv.*, 1959, No. 4. Trans. in *Die Presse der Sowjetunion*, 1959, No. 88, p. 2022. (Available from the Science Library of the Science Museum, Kensington, London, S.W.7.)

ACSIL 1269 "MACHINERY CONSTRUCTION AND SHIPBUILDING VII. THE APPLICATION OF VIBRATION-FREE (ISOLATION) MOUNTINGS FOR NOISE REDUCTION PURPOSES." Janssen, J. H. *De Ingenieur*, 1959, vol. 71, No. 13, pp. 71-78.

ID-U 1959 (12) 628 "MODERNISIERUNG EINES KUPOLOFENS." Kievitskii, P. V. *Lit. Proizv.*, 1958, No. 2, pp. 22.

JCL US AEC-tr-4036 "OBSERVATIONS MADE DURING ELECTROLYTIC-POLISHING OF METALS." Mohlberger, H. *Metall*, 1957, *11*, pp. 756-61. ($4.80 ph, $2.70 mf.)

ACSIL 1354 "IMPROVEMENT OF STRENGTH PROPERTIES OF CAST BESSEMER STEEL." Piwowarski, E., W. Patterson, and F. Iske. *Forsch. Wirts. Nordrhein-Westfalen*, 1958, No. 461, pp. 1-33.

TIL/T 5066 "THE ACOUSTIC FIELDS GENERATED IN SOLID BODIES BY PULSE-EXCITED ULTRASONIC GENERATORS." Rieckmann, P., and F. Linhardt. *VDI-Z*, 1958, vol. 100, No. 18, pp. 778-780.

CEA-tr-R-764 "LA CORROSION DES ACIERS INOXIDABLES AU CONTACT AVEC LES MATERIAUX NON METALLIQUES." Ulanovskii, I. B., and Yu. M. Korovin. *Zhur. Priklad. Khim.*, 1958, *31*, pp. 1366-70. (*NSA*, vol. 14, No. 10, 9744.)

Addresses for sources of translations:—

ACSIL: Department of Research Progress and Planning, Royal Naval Scientific Service, Admiralty, Room 53, Queen Anne's Mansions, St. James's Park, London, S.W.1. JCL: SLA Translation Center, The John Crerar Library, 86, East Randolph Street, Chicago 1, Illinois, USA. TIL: Ministry of Supply Til. 1(a), Room 009, First Avenue House, High Holborn, London, W.C.1. CEA: Commisariat a l'Energie Atomique, P.O. Box 2, Gif-sur-Yvette, S-et-O, France.

House Organs

Sif-Tips Vol. 26. No. 100. Published by the Suffolk Iron Foundry (1920), Limited, Stowmarket, Suffolk.

The brackets in the name of this company serve to remind the reviewer that congratulations are due on the attainment of 40 years of continuous expansion. The making of welding rods was an early undertaking of the firm and since this magazine was first published many examples have been given of unusual jobs. This issue carries the story of a repair of an 150-year-old cast-iron plate which was badly broken in the roof apex of Haughley Church, Suffolk. The notes on this beautiful Church are of real interest and it is good to learn that the repair—quite an intricate one—was successful.

Nickel Bulletin. Vol. 33. No. 6. Issued by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

Work on methods of improving the corrosion-resistance of nickel/chromium electrodeposits is the subject of the abstracts contained in the electrodeposition section of this issue of the *Bulletin*. Literature on cast iron is also represented by items on the properties and application of S.G. Ni-Resist and on the development of a nickel-containing filler-rod for the gas welding of spheroidal-graphite iron, while due attention is paid to papers reporting investigations of the mechanical properties and fabrication characteristics of structural steels. More than half the abstracts relate to corrosion-resisting materials.

Mr. E. WARWICK BROADBENT, founder of the Longclose Engineering Company, Limited, Leeds, and joint founder and financial director of Charles H. Roe, Limited, omnibus-body builders, has died at his home, Crossways, Shadwell Lane, Leeds.

Company News

Wellman's offer for Gibbons

The directors of the Wellman Smith Owen Engineering Corporation, Limited, are to make a direct offer to ordinary shareholders of Gibbons (Dudley), Limited, manufacturers of refractories and coal carbonizing plants, of Dudley (Worcs), for their shares on the basis of one Wellman £1 unit plus £11 10s. cash for every four Gibbons £1 shares. Based on the closing price on Thursday of last week of 153s. 1½d. for the Wellman shares, the offer is worth about 95s. 9d. per Gibbons' share, giving the deal a value of about £1,920,000.

Wellman Smith Owen states that the direct approach is being made because no agreement was reached in discussions with the Gibbons' board held with a view to finding a mutually agreeable basis for that company to join the Wellman group. The Wellman directors add that the acquisition would be of advantage to both companies, as their products are mainly complementary. If the offer goes through, they intend that the present directors and senior staff of Gibbons should continue to manage its business.

The directors of Gibbons state that having taken the advice of S. G. Warburg & Company, Limited, they have informed Wellman Smith that they consider the terms of the proposed offer inadequate, and therefore would not recommend shareholders to accept. The company promises a detailed statement shortly.

Laycock Engineering bid for Hardypick

Details of the bid for Hardypick, Limited, mining-tools and machinery manufacturers, of Heeley, Sheffield, by Laycock Engineering, Limited, Sheffield, are announced. The offer for the whole of the issued 30,000 7 per cent. cumulative preference £1 shares and 70,000 £1 ordinary is 30s. for each preference, and 65s. for each ordinary.

Accepting shareholders will have the right to receive the following further dividends in respect of the year ended June 30, 1960—on the preference 3½ per cent., less tax, and on the ordinary 12½ per cent., less tax. Offers are open until September 2 or such later date, not later than September 23, and is conditional upon 90 per cent. acceptance, or such lesser amount, as Laycock may agree of each class of capital.

In the event of Laycock's obtaining control, it intends to carry on the existing business and retain all the present directors, staff, and workpeople.

MOLER PRODUCTS, LIMITED, manufacturers of heat-insulating products, of Colchester (Essex)—Final dividend of 10 per cent. makes 16⅔ (15) per cent. for the year ended June 30, 1960. Group profit fell to £50,307 (£59,841), after tax of £49,859 (£50,578).

HOLMAN BROS. LIMITED, mining, quarrying, and pneumatic plant manufacturers, of Camborne (Cornwall)—Overseas sales for the year to March 31, 1960, show an improvement over last year, and now represent 69.7 per cent. of the total group turnover, states Mr. P. M. Holman, chairman.

C.A.V. LIMITED—The company has acquired the whole of the share capital of Bryce Berger, Limited, manufacturers of fuel-injection equipment, etc., of Staines (Middx), from the Hawker Siddeley Group, Limited. Bryce Berger will continue to operate as a separate company.

HARLAND ENGINEERING COMPANY, LIMITED—An associated company, Harland Engineering (Australia), Limited, has acquired McKinlay Fletcher, Limited, of Sydney, which represented the UK concern in Australia before Harland's Australian associate was formed 18 years ago. McKinlay Fletcher has continued as agents for the Australian company.

GLACIER METAL COMPANY, LIMITED, bearing and die-casting manufacturers, of Wembley (Middx)—Issue of £750,000 6¼ per cent. debenture stock, 1980-85, is announced, to finance commitments for capital expenditure and for general development and expansion. The company intends in due time to raise further money by a rights issue of ordinary shares.

CONTACTOR SWITCHGEAR, LIMITED—The business of Radio-Aids, Limited, Watford, has been bought for £10,000. The business of the two companies is supplementary and the amalgamation should result in broadening the scope of operations. Mr. E. L. Gardiner will continue as managing director of Radio-Aids, and Mr. H. Rayner and Mr. A. V. Lawry have joined its board.

S. G. BROWN, LIMITED, precision-instrument makers, of Watford (Herts)—The company has now formally become a subsidiary of the Hawker Siddeley Group, Limited, 51 per cent. of its capital having been acquired by the Hawker group's wholly-owned subsidiary, de Havilland Holdings, Limited. The remaining 49 per cent. is held by the American Bosch Arma Corporation. Acquisition of the company from the Admiralty was first announced in June.

NORTON INDUSTRIES, LIMITED, ironfounders, engineers, and scrap merchants, of Wolverhampton—Interim dividend is being raised from the equivalent of 2½ per cent. to 4 per cent. in respect of the year to October 31, 1960. The increase is based on improved profits and the decision to reduce the difference between the final and interim dividends, the directors state. A total equivalent to 10 per cent., plus a capital distribution equal to 1¾d. per 2s. share, was paid for 1958-59.

GEORGE KENT, LIMITED, industrial instrument and automatic-control manufacturers, of Luton (Beds)—Record profits, maintenance of 17 per cent. dividend as forecast on capital increased by a three-for-eight rights issue, and a proposed one-for-one scrip issue are announced. Following the unchanged 5 per cent. interim, the final is held at 12 per cent. for the year to April 2, 1960. The parent company's profit, after tax, is £381,742, compared with £278,586, and the group profit is up to £307,061 from £226,388. Charge for estimated UK income tax for 1960-61 is £326,046.

Allied Ironfounders and Bilston Foundries

The directors of Allied Ironfounders, Limited, in their formal offer for the £420,000 one-class ordinary capital of Bilston Foundries, Limited (Staffs), state that the consolidated profits for the current financial year to date are in excess of those for the corresponding period of last year and foreshadow maintenance of a 20 per cent. dividend on the increased capital.

Bilston directors are accepting the offer of two Allied ordinary £1 shares for every 15 Bilston 2s. ordinary (as stated on July 28) in respect of their own holding and recommend other holders to do likewise.

Trading profits of Bilston, now announced, show a fall from £263,164 to £118,675 in 1959-60, and after tax there remains a net loss of £1,921 compared with a previous profit of £107,692. Mr. T. I. Hobart, chairman, states that the board considers the present setback a temporary one. It has confidence in the future, and long-term prospects of Allied are regarded even more favourably in view of its widely spread activities.

News in Brief

VOEST, Austria's chief iron and steel producer, is to introduce at the end of the year a fifth blast-furnace at its Linz plant.

AN IRON FOUNDRY located in Leicestershire has been fined £5 for not keeping the ablution facilities they provide for their workmen in a clean condition.

WORK ON THE FINAL EXTENSION to the Royal College of Science and Technology, Glasgow, is to commence shortly. It is estimated that it will take four years to complete construction.

UNION CARBIDE, LIMITED, are moving on August 27 from their present address at Mount Street, London, W.1, to new premises with improved facilities at 8, Grafton Street, London, W.1.

A NEWS-RELEASE from the International Nickel Company states that world consumption of spheroidal-graphite iron has approximated 2,000,000 product tons since its introduction some 10 years' ago.

FLEXIBLE DRIVES (GILMANS) LIMITED, have now completed the transfer of their registered office and works from Carlton House, High Street, Smethwick 41, to Skatoskalo Works, Millers Road, Warwick.

CONSTRUCTION HAS COMMENCED of a new iron foundry for Erifo Limited. Buildings will occupy 24,000 sq. ft. of a four-acre site in Manor Road, Erith, Kent, and production is expected to commence in August, 1961.

GRESHAM DEVELOPMENTS, LIMITED, and Lion Electronic Developments, Limited, have been amalgamated to form a new company, Gresham-Lion Electronics, Limited, Gresham House, Twickenham Road, Hanworth, Middlesex.

THE INSTITUTE OF PERSONNEL MANAGEMENT is holding a conference at Harrogate from October 7 to 9 to discuss the theme of "People and Machines." The opening address is to be given by the Minister of Labour, the Rt. Hon. Edward Heath.

A LONDON OFFICE has been opened by Strachan & Henshaw, Limited, mechanical handling plant engineers, of Bristol, at room 351, Victoria House, Southampton Row, London, W.C.1 (telephone: CHAncery 2250), under the management of Mr. P. A. Denning.

WM. CUMMING & COMPANY, LIMITED, Glasgow, Falkirk, Chesterfield and Deepfields, celebrated their diamond jubilee on July 30. All employees who had been in the service of the company for three years or more received a special bonus, and shareholders too received a jubilee bonus.

THE NATIONAL METALLURGICAL LABORATORY, Jamshedpur 7, India, announces the holding, early in February, 1961, of a symposium on the "Light-metal Industry in India." Those interested should write to Dr. B. R. Nijhawan, the director of the laboratories for details of the programme.

STEWARTS AND LLOYDS, LIMITED, has decided to participate in the new graduated state pension scheme on behalf of the 41,000 employees in the group. It is not proposed to make any change in the company's privately operated pension funds so long as the contributions to the state scheme remain "as at present contemplated."

THE NEXT MECHANICAL HANDLING EXHIBITION, will be held at Earls Court, London, from May 8 to 18, 1962. Full details of stand space and facilities for firms wishing to show their products can be obtained from Mr. H. A. Collman, Dorset House, Stamford Street, London, S.E.1.

LAST YEAR 34,093 *tonnes* of pig-iron was imported into Switzerland compared with 30,947 *tonnes* in 1958. West Germany continued as Switzerland's main pig-iron supplier, with 57 per cent. of the market. Coal imports into Switzerland in 1959 amounted to 2,390,000 (2,480,000) *tonnes*. Main supplier was again West Germany.

FELLOWSHIPS for postgraduate research training have been awarded by the British Oxygen Company, Limited, to Mr. P. C. Bonsall, of Birmingham University, for research training at the Royal Technical College, Salford (Lancs), and to Mr. J. W. May, of Oxford University, for research training in the Inorganic Chemistry Laboratory, Oxford University.

MALCOLM OGILVIE & COMPANY, LIMITED, jute manufacturers, Dundee, have formed Dens Metals (Dundee), Limited, with a capital of £24,000. The new firm has been formed for the production of special metal alloys in continuous cast form, a comparatively new process which produces a very high quality article for use primarily in the production of bushes and bearings.

CONFIRMATION HAS BEEN RECEIVED at Dalbeattie, Dumfriesshire, of the opening of a new branch of Steel Radiators, Limited, Middlesex, on the site of the former Royal Naval armament depot and ICI factory at Edingham on the outskirts of the town. The firm specializes in the production of radiators for central heating, and it is stated that production may start before the end of the year.

HOME SALES of farm tractors and machinery were 14 per cent. lower in the first half of this year compared with the same period last year, the sales of combine harvesters being little more than half of last year's total. The Agricultural Engineers' Association reports that there was an overall gain of more than a third in exports, with good increases in sales to Europe in spite of growing German competition.

THE jointly-owned Stone-Manganese Marine, Limited, which was formed in April by the Manganese Bronze & Brass Company, Limited, and Stone-Platt Industries, Limited, has started trading operations. It is responsible for the overseas sales of the marine products of the Manganese Bronze & Brass Company, J. Stone & Company (Propellers), Limited, Bull's Metal & Marine, Limited, and Steven & Struthers, Limited.

THREE MEN were taken to hospital after an explosion at the North Canes, Brownhills factory of Norton Aluminium Products, Limited. The men were feeding aluminium swarf into a machine when magnesium dust ignited. Mr. J. Allen (50) and Mr. C. McFarland (46) received extensive burns and were detained in Walsall General Hospital. Mr. J. Haynes left hospital after treatment. Slight damage was done to one workshop.

PRODUCTION CAPACITY for sodium silicofluoride has been increased by Imperial Chemical Industries, Limited, by over 50 per cent. with the commissioning of a new plant at Billingham (Co. Durham). Sodium silicofluoride is used largely in the glass, vitreous-enamelling, light-alloy, and rubber trades. It has been scarce in the UK for a number of years, but ICI is confident that it can now produce enough to satisfy all the home demand.

Obituary

The death has occurred of Mr. A. L. HETHERINGTON, C.B.E., who for many years represented the Department of Scientific and Industrial Research on the Council of the British Cast Iron Research Association.

The death has occurred of Mr. ALBERT EDWARD ALLEN, who was employed all his working life at the Staveley foundry at Chesterfield. He was a moulder by trade and had completed 50 years with the firm. Mr. Allen was 86.

Dr. C. E. K. MEES, D.SC., F.R.S., HON.F.R.P.S., whose death occurred on August 15 at his home in Honolulu, Hawaii, was an internationally famous scientist who devoted his life to research into and the development of the photographic processes.

Mr. WILLIAM GORDON MARTIN, oversea manager of A. Reyrolle & Company, Limited, manufacturing electrical engineers, of Hebburn-on-Tyne has died at the age of 57. He joined the company about 30 years ago and before taking up his last position two years ago was outside manager for Scotland.

The death occurred early August of Mr. B. GODBER, late foundry manager of Machynys Foundry & Engineering Works, Llanelly—a branch of Richard Thomas & Baldwins, Limited. Mr. Godber was an associate member of the Institute of British Foundrymen, joining in 1936, and was attached to the Wales & Monmouth branch.

Lieutenant-General LORD WEEKS, former chairman of Vickers, Limited, died last Friday. At the time of his death he was chairman of the Finance Corporation for Industry, and was on the boards of Associated Electrical Industries, Limited, British Petroleum, Limited, the Hudson's Bay Company, Massey-Ferguson (Holdings), Limited, Oldings (Hatfield), Limited, Pilkington Brothers, Limited, and the Royal Exchange Assurance.

Chairman of G. N. Haden & Sons, Limited, London, heating and ventilating engineers, for many years, Mr. GEORGE NELSON HADEN has died at the age of 60. After experience in America he joined the company in 1923, becoming a director in the following year and chairman in 1938—a position he held until his recent retirement. Mr. Haden was president of the Institution of Heating and Ventilating Engineers in 1938 and was awarded its gold medal in 1959 "for services of outstanding value over a long period."

The death is announced of Mr. H. J. ALLUM, a representative since March, 1941, of *Rylands Directory* produced by *Iron & Coal Trades Review*, sister journal of the FOUNDRY TRADE JOURNAL. Mr. Allum had spent most of his working life in association with the iron, steel, metals, and hardware trades. Of a quiet and unassuming nature, his was a personality which endeared itself to his colleagues and created innumerable friendships in the trades he served. Mr. Allum died suddenly at his home in Harrow (Middx). He was 73.

WHEN REPORTING the death of Mr. A. G. Howell in the JOURNAL last week, it was incorrectly stated that for the past 25 years Mr. Howell had been foundry manager of Goulds Foundries, Limited, Cardiff. In fact he was foundry manager of the Tubal Cain Foundry, Cardiff, for this long period, his service with Goulds Foundries being prior to his joining the Tubal Cain Foundry (first as foreman patternmaker).

Operation "Cleansweep"

Preparations are now in hand for the biggest onslaught against untidiness in Britain's factories for nearly 10 years. Operation "Cleansweep," which forms the central theme of the National Industrial Safety Week, organized by the Royal Society for the Prevention of Accidents (RoSPA), will be mounted during the week beginning September 26 as all kinds of factories everywhere in the country clear away accident-producing accumulations of waste, litter, scrap metal and idle, rusting, derelict plant from yards, storerooms and workshops. The result of the campaign, if successful, will be the elimination of many dangerous hazards in factories.

The removal of items likely to cause tripping, slipping, bumping and falling would result in a reduction of a number of accidents at present forming an ominous group stigmatized by H.M. Chief Inspector of Factories as the "Big Five." This group, which includes such causes officially classified as, "persons falling," "fall of objects," "handling goods," "stepping on or striking against objects," and "use of hand tools," accounts for nearly 70 per cent. of accidents occurring in industrial premises subject to the statutory provisions of the Factories Acts.

Rubery Owen Wheelmaking Plant in South Africa

The first £400,000 sterling section of its new £1,250,000 factory at Port Elizabeth is being installed by Ruberowen (South Africa), Limited, an associate of Rubery Owen & Company, Limited. Semi-automatic wheel-manufacturing plant will make 300 car wheels per hour at a cost somewhat higher than in Europe. Press tools for each type of wheel cost £2,000.

Ruberowen will start next year making petrol tanks, rear-axle cases, and front-suspension units, and in the third stage chassis frames will be made. Part of the company's programme will be carried out at Roodepoort, in the plant of Metal Pressings, Limited, formerly a subsidiary of Vanderbijl Engineering (Vecor), Limited, which has a 51 per cent. interest in Ruberowen, while the UK company owns 49 per cent.

The company hopes to develop exports in the Far East and South America.

Royal Guest at JIC Banquet

Guest of Honour at the annual banquet of the Joint Iron Council will be H.R.H. the Duke of Edinburgh. Other notable guests include the Lord Mayor of London, Sir Edmund Stockdale, and the Minister of Power, the Rt. Hon. Richard Wood, M.P. The banquet is to be held at the Guildhall, London, on November 1. (It is understood that, concurrently with this issue of the JOURNAL, the JIC is sending out official notifications and ticket reservation forms to member-firms of the Council of Ironfoundry Associations and the Council of Iron Producers.)

FORTY-FIVE EMPLOYEES at the East Hecla Works of Hadfields, Limited, Sheffield, have received presentations on completion of 25 years' service with the company. Formed in 1952 with 1,157 members, membership of the Hadfields' "25 Association" now totals 1,494.

Personal

Mr. F. DULHANTY has been appointed works manager of Brockhouse Castings, Limited, Wednesfield, Wolverhampton.

Mr. DENIS R. WARD, assistant secretary, and Mr. ARTHUR W. GURNEY, chief cost accountant, have been appointed local directors of Hadfields, Limited.

Mr. J. ALCOCK, works manager since 1956 of the 600 Group company, Midgley & Sutcliffe, Limited, Hunslet, Leeds, has been appointed to the board.

Rolls-Royce, Limited, announce the retirement of Dr. A. A. GRIFFITHS, their chief scientist. His services are to be retained in a consultative capacity.

Mr. T. H. WHITEHOUSE, who is well known in the foundry-equipment industry, has joined the board of J. & T. Whitehouse, Limited, an agency business.

Mr. W. BARNES has resigned as managing director of Beans Industries, Limited, a wholly-owned subsidiary of Standard-Triumph International, Limited.

For reasons of health Mr. T. JOLLY, joint managing director of Guest Keen Iron & Steel Company, Limited, will retire from his office and from the board on January 1, 1961.

Mr. FREDERICK W. THOROGOOD, works superintendent and a special director of George Mann & Company, Limited, printing machine manufacturers, of Leeds, has died at the age of 48.

Mr. JOHN H. D. PEARCE, formerly sales manager of Dartmouth Auto Castings, Limited, Smethwick, 40, Staffs, high-duty iron founders, has been appointed to the board of the company as sales director.

Mr. R. W. STUART MITCHELL, chief engineer for the Associated British Engineering Company, Limited, has been appointed Professor of Gas Turbine Technology at the Technological University of Delft, Holland.

Mr. JAMES CARTWRIGHT, who was foundry superintendent at Richmonds Gas Stove Company, Limited, when he retired four years ago after 54 years' service with the company, celebrated his golden wedding on August 20.

Mr. C. F. PAGNAMENTA, O.B.E., F.C.A., secretary of Guest Keen Iron & Steel Company, Limited, has been elected a director. He joined the company in October, 1957, as chief accountant and became secretary in August, 1959.

Sir DONALD PERROTT has been appointed to the board and deputy chairman of Dewrance & Company, Limited. Mr. M. J. VEREY has resigned from the board. Dewrance is a subsidiary of Babcock & Wilcox, Limited.

After 40 years with Birtley Engineering, Limited, Mr. RUEBEN BELL, projects engineer, has retired. He has served as president and vice-president of the North Durham branch of the Association of Engineering and Shipbuilding Draughtsmen.

Mr. THOMAS SHOPLEY, oldest and longest-serving employee of the Johnson Iron & Steel Company, West Bromwich, has retired after 60 years' service with the company. Presentations have been made to him by the directors and colleagues.

Mr. CLIFFORD BUTTERFIELD, chairman, and Mr. A. J. BUTTERFIELD, vice-chairman, of W. P. Butterfield, Limited, engineers and tank manufacturers, Shipley, Yorkshire, have been appointed life president and chairman of the company respectively.

The Minister of Labour has appointed the EARL OF VERULAM as chairman of the National Advisory Council on the Employment of the Disabled in place of Sir HAROLD WILES, K.B.E., C.B., who has resigned. Sir Harold Wiles will continue to serve as a member of the Council.

Mr. E. H. BLACK, chief engineer of the Midlands division, Marco Conveyor & Engineering Company, Limited, has been appointed chief engineer to the company. He will be based in the head office at Rowin Works, Leytonstone, London, instead of in Birmingham as hitherto.

Mr. EDWIN BADEN has been appointed chairman of Matthew Hall & Company, Limited, in place of the late Mr. BERTRAM BADEN, and has resigned as managing director. Mr. R. R. BADEN has been appointed deputy chairman, and Mr. P. D. DOULTON and Mr. S. KINDLER have been appointed managing directors. Mr. R. M. SPEIR, Conservative MP for Hexham, has been appointed a director.

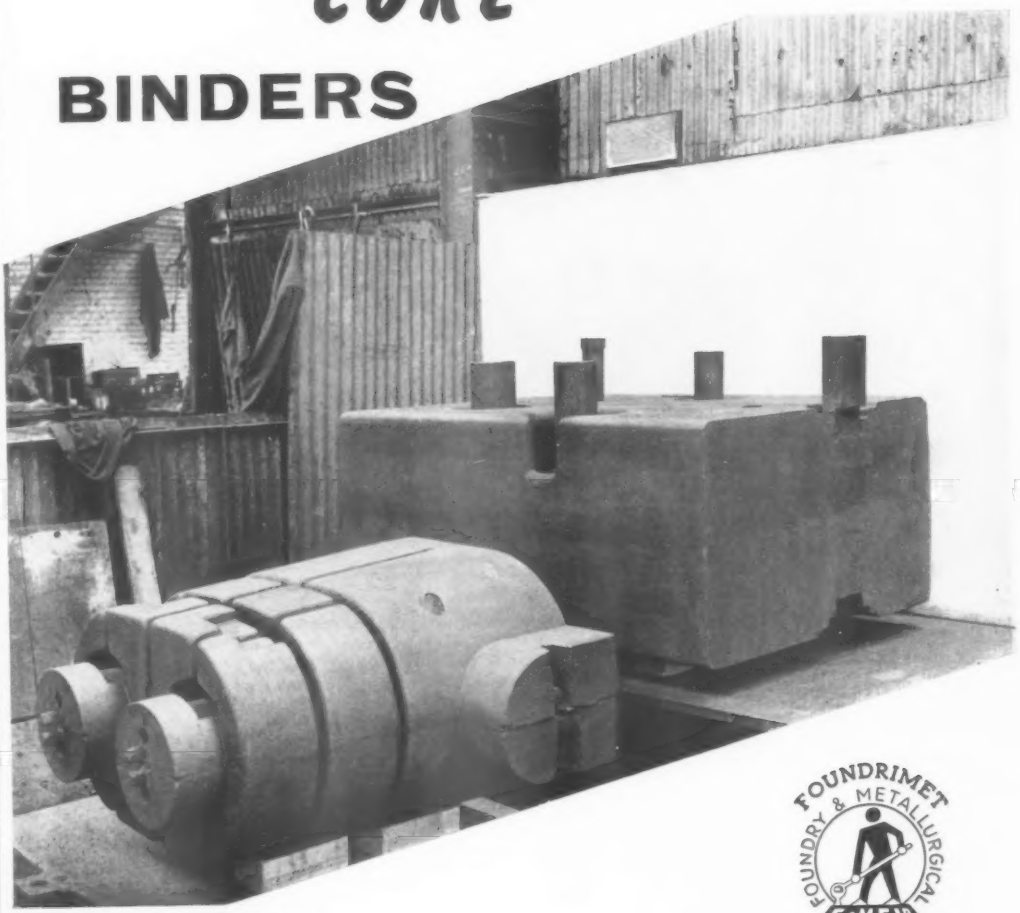
Professor of Aircraft Propulsion at the College of Aeronautics, Cranfield, Prof. AUSTIN GEOFFREY SMITH, has been elected the first holder of the Hives Chair of Thermodynamics, endowed by Rolls-Royce, Limited, in the University of Nottingham. He will be the head of the department of mechanical engineering in succession to Prof. J. A. Pope. Most of Prof. Smith's work has been on gas-turbines, particularly jet-engine aerodynamics.

Guest Keen & Nettlefolds, Limited, announce that with the objective of providing more direct and personal assistance to the chairman, Mr. W. A. NICOL (director and group secretary) and Mr. W. W. FEA (director and group chief accountant) are relinquishing their offices and have been appointed administrative director and financial director respectively. Mr. J. F. HOWARD has been appointed group secretary and Mr. F. C. ROWBOTTOM, becomes group chief accountant.

Mr. FREDERICK JOHNSON has been appointed a director and general manager of John Smith (Keighley), Limited, a subsidiary of Thos. W. Ward, Limited, as from September 1. He succeeds Mr. G. A. SMITH who is resigning as managing director on September 1 but will remain on the board in a consultative capacity. Mr. CYRIL BLAND and Mr. E. C. W. SWANN, local directors, have been appointed to the main board of John Smith, and Mr. CHARLES SMITH, a local director, has retired from the company for health reasons.

Successor to Dr. J. C. Hudson (whose retirement was announced in last week's JOURNAL) as head of corrosion research in the chemical department of the British Cast Iron Research Association is Mr. J. F. STANNERS, B.SC., who for the last eight years has acted as Dr. Hudson's deputy. Before joining, in 1945, the staff of the corrosion committee of the Iron and Steel Institute, Mr. Stanners was an analytical and research chemist at the laboratories of Thorium, Limited (now the Radio-Chemical Centre) at Amersham; he transferred to BISRA, with Dr. Hudson, when the corrosion committee was taken over by the Association. Mr. Stanners is the representative of the Association on the technical panel of the Joint Committee for Co-ordination of the Cathodic Protection of Buried Structures. Mr. E. E. WHITE, who has been appointed head of the BISRA Corrosion Advice Bureau, has been technical secretary, since 1950, of BISRA's corrosion committees and chemistry department, which post he still retains. In 1954 he was appointed secretary of the newly-formed Corrosion Advice Bureau, and since 1957 he has been chairman of the education panel of the corrosion group of the Society of Chemical Industry.

SUPINOL CORE BINDERS



Photograph of cores weighing approx. 35 cwts by courtesy of Seagers Ltd. Dartford.

FOUNDRIMET FOUNDRY & METALLURGICAL F.&M.S.L.

Manufactured by

F. & M. SUPPLIES LIMITED

4. BROAD STREET PLACE LONDON E.C.2.

TELEPHONE: LONDON WALL 7222 (4 lines)

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Prompt deliveries from stocks in

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Raw Material Markets

Iron and Steel

Production of pig-iron is maintained at a high level and continues at an average annual rate of over 15,000,000 tons. The major portion, comprising over 80 per cent. of total outputs, is in basic steelmaking iron and overall demands from the steelworks enable producing furnaces to dispose fully of their makes. The supply of scrap in most areas is insufficient to satisfy in full the requirements of the steelworks and their ingot production depends mainly on the supply of pig-iron.

In the foundry grades of pig-iron outputs are adequate to meet present demands and in practically all grades of iron makers could step up current deliveries appreciably if called upon to do so. The low phosphorus irons are in biggest demand and substantial tonnages continue to be used by the engineering and speciality foundries.

Hematite also is being taken up in appreciable tonnages by these foundries and together with the refined irons, where required, no difficulty is experienced by the foundries in obtaining the supplies required. High phosphorus irons are also plentiful and producers would welcome additional business both from home and also from overseas buyers. Orders from the latter, however, are difficult to obtain against the strong competition by continental producers.

Most of the engineering foundries continue to obtain maximum outputs of castings consistent with the labour available. For the present order-books are full and sufficient work is on hand to enable them to maintain their outputs for some months ahead. The motor vehicle trade continues to specify freely and the machine-tool trade is calling for increased quantities of castings.

The building trades maintain their demand for castings from the light foundries catering for them, and these foundries are reasonably employed. From the domestic utensil trade the call for castings continues moderate, but jobbing and textile foundries are fairly well engaged. The foundries concerned, however, are not employed anywhere near capacity levels.

Deliveries of scrap to the ironfoundries are generally satisfactory and there is no difficulty in obtaining the required quantities of foundry and furnace coke, ganister, limestone, and firebricks.

Most of the re-rollers have plentiful supplies of steel semis on hand and in some instances deliveries from home steelworks have been curtailed until these tonnages have been reduced. The orders on hand for small bars, light sections, and reinforcing rods are sufficient to enable them to increase their present high outputs, but shortage of suitable labour is a hindrance.

Home steelworks are able to meet the present demand for billets, blooms, etc., without difficulty and increased tonnages can be supplied as the need arises.

Non-ferrous Metals

Interesting reversal of price trends for copper and tin is noted this week. LME price for cash copper at the weekend closed £5 a ton cheaper at £241 17s. 6d., while cash tin improved £6 to 798 10s. per ton. On Monday of last week the cash price for copper declined to £240 10s., its lowest level since June, but throughout the rest of the week it steadily gained ground. On the other hand the trend of tin prices was markedly downwards and by Friday it had reached it lowest level since June 14.

The downward drift in tin prices was strongly assisted by the completion of deliveries under earlier forward contracts to the buffer stock as well as by the resumption in the regular flow of Indonesian tin, but the usual seasonal contraction in demand also had its effect. If the weekend trend conforms to past experience it could well mean the beginning of the covering of purchases for the autumn revival in tin consumption.

The position should be clearer today (Thursday) when the International Tin Council meets in London to fix the export quota for the closing quarter of this year. In view of the remaining uncertainties in the Congo as well as the continuing difficulties of Bolivia in meeting its quotas, the ITC might well, if the fall in prices had continued, have found it difficult to reach a decision on what the position should be for the final three months of the year.

For several weeks now a reaction had been expected for copper. Although for this metal, too, the prospects for supplies from Katanga remain uncertain, world production has for some months been running sufficiently ahead of current consumption to balance out any possible contraction or even interruption of Congo shipments. Labour difficulties at the Chuquicamata mine only serve to cloud the issue still further.

Official LME stocks of copper have now been rising without interruption for eight weeks and at the weekend reached 6,208 tons, the highest level since the end of November, 1959. Though still below what may be termed a comfortable level, this tonnage is large enough to exclude the threat of a squeeze which, earlier this year when stocks fell as low as 1,674 tons, was inevitable.

In London there was a pause in the recent moderate rise in lead prices and generally the market was lethargic. Zinc eased slightly, but prospects of more US metal arriving in Britain had an unsettling effect.

Forty Years Ago

Articles in the August, 1920, issue of the JOURNAL reflected extremely well matters which were then occupying the activities of progressive foundrymen. The major questions at that time were the use of oil-sand cores and "semi-steel," and there was also a realization of the inadequacy of existing plant and control. The late Mr. R. Miles, who is quoted in the issue as wisely remarking, that "necessity is the mother of invention," forecast that suitable machines for mixing oil and sand would soon come. Mr. W. J. Evans is reported as saying that he used three brands of pig-iron in his cupola mixes to equalize the variations of silicon content. That was a recognized method of the period for composition control and had much to recommend it. The following concerns were listed under "New Companies": Southgate (Birmingham), Limited and Cudworth, Limited, of Wrexham.

EDGAR ALLEN & COMPANY, LIMITED, announce that its subsidiary company, Buell, Limited, 3, St. James's Square, London, S.W.1, has obtained an order from the Lancashire Steel Corporation, Limited, for the supply of drying plant complete with dust collectors and other ancillary equipment. The total value of the contract exceeds £200,000. This company has also received an order for the erection of three Buell vertical turbo-dryers, each with an output of 9½ tons per hour of china clay. The total value of the order is approximately £100,000.

Baker Perkins Foundry Machinery at work ... *at the Southend Engineering Co. Ltd.*

This Baker Perkins Girojet Universal Shot Blasting Machine operates without compressed air, needs negligible maintenance and costs little to run. And here's another advantage—no foundations are needed. The Girojet will take an evenly distributed load of 500 lbs. Average shotblasting times: aluminium (2-4 minutes); grey iron (3-6 minutes); malleable cast iron or bronze (4.5-8 minutes); forged steel or stamped steel (10-20 minutes).

This is the machine that completely replaces the hand cabinet.

Please write for full details today.

Baker Perkins Ltd. ENGINEERS

Bedewell Division, Hebburn-on-Tyne, Co. Durham
Telephone : Jarrow 897124

HISTORICAL NOTE

Southend Engineering Company was established in 1901, and manufactured Marine and Stationary engines until 1914. The Firm has produced its own non-ferrous castings since 1938. They manufacture the "Viking 3" Outboard Motor, a set of flame guns for agricultural purposes, and a range of Stern Gear and fittings for marine engine manufacturers.

BP F10

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

August 24, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6d. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £42 10s. 0d. to £44 10s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 15s. 0d. to £61 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-Vanadium.—50/60 per cent., 20s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 1d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 1d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £80 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr. scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 10¾d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £275 0s. 0d.; 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £61 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—BASIC: soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

* Average 68-70 per cent.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plate (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast), £44* 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d.; angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast), £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £67 17s. 0d.; nickel-chrome, £98 11s. 0d.; nickel-chrome-molybdenum, £111 4s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £242 5s. 0d. to £242 10s. 0d.; three months, £241 10s. 0d. to £241 15s. 0d.; settlement, £242 15s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 4¾d. per lb.; rods, 261s. 6d. per cwt. basis; 20 s.w.g., 296s. 6d. per cwt.

Tin.—Cash, £800 0s. 0d. to £801 0s. 0d.; three months, £802 10s. 0d. to £803 10s. 0d.; settlement, £801 0s. 0d.

Lead (Refined Pig).—Second half August, £70 15s. 0d. to £71 0s. 0d.; second half November, £71 0s. 0d. to £71 2s. 6d.

Zinc.—Second half August, £85 12s. 6d. to £85 15s. 0d.; second half November, £85 10s. 0d. to £85 15s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £122 12s. 6d.; rolled zinc (boiler plates), all English destinations, £120 7s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £102 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 11½d. per lb.; sheets to 10 w.g., 213s. 3d. per cwt.; wire, 2s. 9¾d.; rolled metal, 213s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £173; B6, £224.

Brass (High Tensile).—BS1400, HTB1, £198; HTB2, £216; HTB3, £234.

Gunmetal.—BS1400, LG2, £218; LG3, £229; G1, ½%, £286; G1, 1%, £275.

Phosphor Bronze.—BS1400, PB1 (AID released), £315; BS1400, 90/10/1, £302.

Leaded Phosphor Bronze.—BS1400, LPB1, £240.

Phosphor Bronze Strip, etc.—Strip, 303s. 9d. per cwt.; wire, 4s. 2½d. per lb.; rods, 3s. 5½d.; tubes, 3s. 5½d.; chill cast bars, solids 3s. 5d.; cored 3s. 6d (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 11½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £69 15s. 0d. to £70 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £255, AB2, £265.

Coventry Apprenticeship Scheme

A group apprenticeship scheme designed to give a comprehensive training for indentured apprentices among the smaller and specialist firms was inaugurated by Coventry Chamber of Commerce last week. It aims to provide facilities to train boys to a standard equal to that offered by large organizations. In the first group, which has started operations, 17 member firms will provide training for craft, technician, and student engineer apprentices in all branches of precision engineering.

Each apprentice will follow a planned practical course in his own company, supplemented by additional experience in other firms of the group. Operation of the scheme will be undertaken by Industrial Administration, (R & A), Limited, of London, which operates and finances the 18 groups of the engineering industries' group apprenticeship scheme.

Walsall Foundries' Merger

Two neighbouring and competing Walsall foundries, Chamberlin & Hill, Limited, Chuckery Road, and Sydenham & McOustra, Limited, of Beacon Street, are merging. The entire share capital of Sydenham & McOustra, Limited, has been bought by the larger company. Mr. Norman J. Fox, managing director, and his brother, Mr. Austin Fox, of Sydenham & McOustra are to retire shortly after a combined service of 82 years in the business. Mr. M. M. Hallett, managing director of Chamberlin & Hill, said there would be no redundancy, and the activities of both companies would be enlarged.

New Trade Association Formed

The Lorry Mounted Crane Association was formed at the end of last year to administer and direct the activities of the industry in Britain. Operation of lorry-mounted cranes has in the last 10 years become highly specialized and, in view of the risk sometimes involved, several large owners of the cranes felt that a central organization should be formed to act in the interests of the industry and the cusomer. The headquarters are at 301 Glossop Road, Sheffield 10. The Association has set out to guarantee a minimum standard of insurance, safety and reliability, and it will also endeavour to rationalize legislation regarding the use of lorry-mounted cranes. (At present owners, drivers, and operators have to comply with a variety of regulations, some of which were designed before such machines were envisaged.)

Rules of membership have now been established by the inaugural committee of the Association and details are available from the address quoted above.

Recent Wills

COCHRANE, S. J., a director of Cochrane & Sons, Limited shipbuilders, of Selby (Yorks)	£92,449
GLYN, LORD, deputy chairman of J. Samuel White & Company, Limited, shipbuilders, of Cowes (Isle of Wight)	£110,036
HEALEY, A. W., production manager of John Smith & Company (Derby), Limited, brassfounders and engineers	£5,468
BARKER, THOMAS, secretary and a director of Sterling Metals, Limited, manufacturers of castings, etc., of Nuneaton	£9,985
NEILD, ARTHUR, late of Manchester College of Technology and a member of the Manchester Association of Engineers	£3,240

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Pig-iron and Steel Production

Statistical Summary of June Returns

The following particulars of pig-iron and steel produced in Great Britain are from statistics issued by the British Iron and Steel Federation. Table 1 summarizes activities during recent months. Table 2 gives production of steel ingots and castings in June. Table 3, weekly average production of finished steel in May. Table 4 gives the production of pig-iron and ferro-alloys in June, and furnaces in blast. (All figures are weekly averages in thousands of tons).

TABLE 1.—*Iron and Steel Index and General Summary of Pig-iron and Steel Production.*

Period.	B.o.T. Price Index. 1938 = 100.			Iron-ore output.	Imported ore used.	Coke sent to blast furnaces.	Pig-iron, ferro-alloys prod.	Scrap used in steel prod.	Steel (incl. alloy).			
	Iron and steel.	Coal.	Basic materials[1]						Imports.[2]	Prod. ingots, castings.	Delivrs. finished steel.	Stocks.[3]
1958	343	403	478	276	262	227	245	196	9	369	284	2,242
1959	340	497	477	286	244	210	242	208	7	388	291	2,244
1960—March[4]	337	502	487	347	325	262	312	286	19	485	376	2,243
April ..	338	502	488	326	329	265	311	251	23	478	369	2,292
May ..	338	483	489	337	317	261	299	252	27	475	393	2,248
June[4]	339	483	489	297	314	261	295	247	38	466	362	2,329

TABLE 2.—*Average Weekly Production of Steel Ingots and Castings in June.*

District.	Open-hearth.		Bessemer.	Electric.	All other.	Total.		Total ingots and castings.
	Acid.	Basic.				Ingots.	Castings.	
Derbys, Leics, Northants, and Essex	—	5.0	14.9 (basic)	2.6	0.1	21.1	1.5	22.6
Lancs (excl. N.W. Coast), Denbighs, Flints, and Cheshire	1.3	39.4	—	5.4	0.4	45.1	1.4	45.2
Yorkshire (excl. N.E. Coast and Sheffield) ..								1.3
Lincolnshire	—	46.5	—	—	0.1	46.5	0.1	46.6
North-East Coast	0.7	86.9	—	1.6	0.4	87.6	2.0	89.6
Scotland	1.1	49.5	—	4.1	—	52.6	2.1	54.7
Staffs, Shrops, Worcs, and Warwicks	—	23.5	—	4.4	0.7	26.8	1.8	28.6
S. Wales and Monmouthshire	2.0	91.8	15.9 (basic)	0.8	0.1	110.2	0.4	110.6
Sheffield (incl. small tonnage in Manchester) ..	8.1	38.7	—	13.5	0.4	58.8	1.9	60.7
North-West Coast	—	—	5.7 (acid)	0.8	—	6.4	0.1	6.5
Total	13.2	381.3	36.5	33.2	2.2	455.1	11.3	466.4
May, 1960	14.7	385.2	38.9	34.4	2.2	463.6	11.8	475.4
June, 1959[4]	13.5	320.8	24.9	27.2	2.1	378.3	10.2	388.5

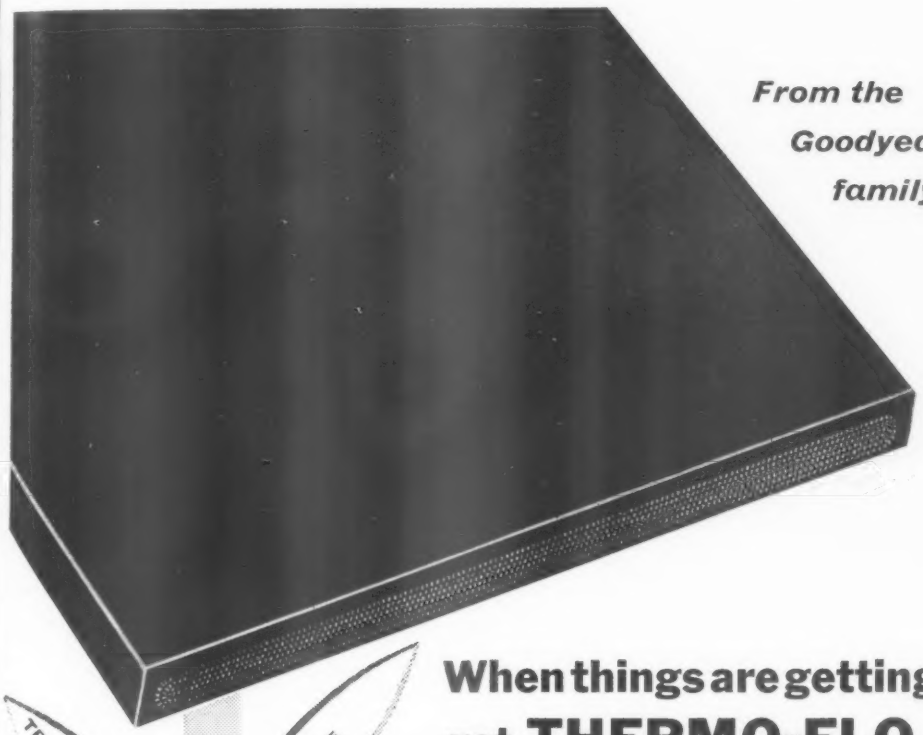
TABLE 3.—*Deliveries of New Non-alloy and Alloy Finished Steel*

Product.	1958.	1959.	1959.	1960.	
			May.	April.	May.
Non-alloy Steel:					
Ingots, blooms, billets and slabs[6]	4.6	5.1	5.1	5.8	5.8
Heavy rails ..	10.2	6.8	7.3	9.3	11.1
Sleepers ..	1.2	0.6	0.5	0.5	1.8
Fish and soleplates	0.7	0.4	0.6	0.7	0.9
Plates, 3 mm. thick and over ..	47.3	43.1	42.6	55.2	55.0
Other heavy prod.	41.8	41.2	41.4	56.5	53.2
Ferro-concrete bars	7.6	9.6	8.7	10.2	11.6
Wire rods	21.5	23.5	24.2	29.8	30.8
Arches, etc. ..	8.6	7.8	8.5	8.6	9.3
Other light sections	29.1	33.0	30.5	41.7	44.2
Bright steel bars ..	6.2	7.6	7.1	10.0	10.7
Hot-rolled strip ..	22.6	27.4	26.9	33.8	35.8
Cold-rolled strip ..	7.0	8.0	7.3	9.9	11.2
Sheets, including coated ..	41.7	47.0	44.8	53.7	56.8
Tinplate:	18.7	20.7	20.5	24.4	24.6
Blackplate	0.8	0.7	0.6	0.8	1.0
Tubes up to 16 in.	19.0	20.6	18.1	24.1	26.7
Tube fittings, etc. ..	0.4	0.4	0.4	0.4	0.4
Tyres, wheels, axles	4.5	2.4	2.6	2.3	2.9
Forgings (excl. drop)	2.6	2.1	2.5	2.2	2.5
Steel castings ..	4.2	3.6	3.7	4.0	4.4
Tool steel ..	0.2	0.2	0.3	0.2	0.3
Total	300.5	312.0	304.2	384.1	402.0
Alloy steel	16.1	18.2	17.4	22.5	25.1
Total deliveries from UK prod.[5] ..	316.6	330.2	321.6	406.6	427.1
Add: Imported finished steel ..	7.0	7.1	8.3	23.2	26.9
	323.6	337.3	329.9	429.8	454.0
Deduct: Intra-industry conversion[7] ..	41.2	47.6	46.5	62.0	62.0
Total new material ..	282 4	289 7	283 4	367.8	392.0

TABLE 4.—*Production of Pig-iron and Ferro-alloys*

District.	Furnaces in blast.	Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derbys, Leics, Notts, Northants, and Essex	19	—	30.4	19.9	0.1	—	50.4
Lancs (excl. N.W. Coast), Denbighs, Flints, and Cheshire ..	7	—	18.4	—	—	1.8	20.2
Yorkshire (excl. N.E. Coast and Sheffield) ..	—	—	—	—	—	—	—
Lincolnshire ..	8	—	36.7	—	—	—	36.7
North-East Coast	17	2.4	60.1	—	—	1.4	63.9
Scotland	7	0.6	25.2	0.8	—	—	26.6
Staffs, Shrops, Worcs, and Warwicks ..	5	—	10.9	1.1	—	—	12.0
S. Wales and Monmouthshire	11	2.7	59.6	0.9	—	—	63.2
Sheffield	2	—	3.5	—	—	—	3.5
North-West Coast	8	15.8	—	1.6	—	1.3	18.7
Total ..	84	21.5	244.8	24.3	0.1	4.5	295.2[4]
May, 1960 ..	85	22.0	245.7	26.6	0.2	4.6	299.1
June, 1959[4] ..	77	18.1	193.4	19.6	1.2	3.0	235.3

[1] Used in non-food manufacturing industries.
[2] Weekly average of calendar month.
[3] Stocks, mainly ingots and semi-finished, at the end of the year and months shown.
[4] Five weeks, all tables.
[5] Other than for conversion into any other form of finished steel listed.
[6] Includes finished steel produced in the UK from imported ingots and semi-finished steel.
[7] Material for conversion into other products also listed in this table.



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Publications Received

Working Aluminium in Shipyards, second edition (*Bulletin* No. 18). Published by the Aluminium Development Association, 33, Grosvenor Street, London, W.1; price 2s.

This *Bulletin* was first issued by the Aluminium Development Association in 1951. Since that date considerable progress has been made in techniques with aluminium—especially in connection with jointing processes—and much experience has been gained in shipyard practice. The general plan of the book is substantially as before, the first major section dealing with working practice such as sawing, milling, arc cutting, bending and forming, and sheet-metal work. In the second section dealing with joining methods, prominence is given to the inert-gas shielded-arc methods developed since the first edition was published.

Other major sections of the book deal with practice when aluminium is in contact with other materials—with a special note on boundary bar connections—and with painting and protection. In the appendices are listed the aluminium alloys most suitable for shipbuilding together with data on the forms and sizes in which aluminium and its alloys are generally available. There is also a list of insulating materials and jointing compounds suppliers.

Les Budgets Familiaux des Ouvriers de la Communauté Européenne du Charbon et de l'Acier. (Family budgets of the workpeople of the European Coal and Steel Community. Published by the Service des Publications des Communautés Européennes, 40, Rue de Louvain, Brussels), if bought in Paris, 26, rue Desaix, Paris 15); price 50 Belgian francs or five new French francs.

This is the French edition, which finally will appear in the four official languages of the Communauté. It is a ponderous tome, running to 436 pages and illustrated with numerous slightly amusing graphs. The survey has covered 2,000 families located in the industrial areas of the six associated countries. In these days of the fluctuating value of currencies, relating the standard of living to the consumption of food and drink, accommodation, and the quantity and value of clothing, probably gives a true picture of actual conditions under which the workmen live.

Factory Building Studies No. 6. Noise in Factories. Published for the Department of Scientific and Industrial Research by HM Stationery Office, York House, Kingsway, London, W.C.2; price 3s. 10d. post free.

The trend towards more-powerful machines is making the problem of noise in factories increasingly serious. In some factories measures are being taken to reduce existing noise levels. However, there is much that can be done at the initial stages of design to reduce the noise problem. A survey of the main causes of noise in factories and available methods of reducing it is detailed in this 30-page illustrated booklet. Divided into two parts, the book first explains how noise is generated in industrial operations and its effect on people nearby, and then discussess the various ways of reducing noise in factories and their effectiveness.

Transactions of the Manchester Association of Engineers, Sessions 1956-57 and 1957-58. Published by the Association from 18, Booth Street, Manchester.

The volume for the year 1956-57 is an important one as it marks the centenary of the formation of the Association. The celebrations are detailed and make interesting reading. Since the days when Mr. Tom Makemson was secretary of the Association, papers on foundry practice published in these *Transactions* have been few and far between. Nowadays, the papers range widely in their coverage, but one with particular appeal for foundrymen is "John Rennie (1761 to 1821) —A Study of the Life and Work of an Engineer in Georgian Times." by Dr. C. T. G. Boucher. It is a fascinating study of a great engineer and foundryman, and it is interesting to learn that the patterns he used are still in existence at Claverton foundry situated near Bath. As a record of the progress of engineering in general these volumes are invaluable as a source of reference.

Recommended Practices for Metallizing Shafts or Similar Objects. A committee report, published by the American Welding Society from 33, West 39th Street, New York 18, USA; price $1.00 plus postage.

This is a thoroughly practical publication and covers quite a few specific applications of interest to foundry engineers and patternmakers; in fact much of the material disclosed is equally applicable to components other than shafts. The descriptions are enhanced by photographs and clear diagrams. Metallizing is a process not lightly to be undertaken by the inexperienced, for some auxiliary plant is required in addition to machine-shop equipment.

Aimants Modernes (Modern Magnets). Published by *Chambre Syndicale des Producteurs d'Aciers Fins et Spéciaux*, 12, Rue de Madrid, Paris, 8.

This publication is the text of a paper given by Mr. A. Gaillet of the *Société d'Electrochimie d'Ugine-Eaux-Claires* who has much to say about the Alnico type magnets (Co 24, Ni 14, Al 8, Cu 3, Fe 51 per cent) which are cast using the shell-moulding process. The powder-metallurgy method of making magnets is also dealt with and discussion on the paper is appended. Magnet making is an important industry and over 1,000 tons were produced last year in France.

Durgapur. Published by the Indian Steelwork Construction Company, Limited, London.

This booklet is a statistical survey of progress in the construction of the very large Indian steelworks by a British consortium at Durgapur. It records that to date the contract times have been fulfilled and expresses confidence that the final stage will be completed, as scheduled, in July, 1961. Also recorded in the booklet are the estimated outputs of the products and many other figures, including those of expected employment when the project is completed.

Introduction to Duxford. Published by Ciba (A.R.L.), Limited, Duxford, Cambridge.

Written in non-technical language and well illustrated, this 24-page brochure tells of the origin of the company and its development into an important manufacturing group with overseas associated works. Included in the brochure is a description of the firm's standard products.

Brazilian Bulletin. Vol. 9, No. 5. Published by the Brazilian Government Trade Bureau, 157-161, Regent Street, London, W.1.

This issue carries an excellent illustrated account of Brasilia, the new capital of Brazil. This amazing city of ultra-modern architecture has been built in three years in what was a forest location, over 500 miles from the nearest city.

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New Catalogues

Bentonite. From Production Chemicals (Rochdale), Limited, Victoria Buildings, 32, Deansgate, Manchester 3, is available a version in English of a brochure originally issued by the French firm Société Française des Glycérines, for whom they are agents for a type of bentonite. This brand is known as Bentonil—and the booklet gives much practical information as to how the material should be used and the results obtainable. Large graphs show the shear-strength range which is imparted by the three types of the material—AF, C, and CF—to sand with varying moisture content. The fact that the brochure is a translation adds interest to the subject, because there is a novel "slant" in presentation of the data. The agency which the British firm has secured covers not only this country but the Commonwealth also.

Moulding Machines. W. J. Hooker Limited, 239A, Finchley Road, London, N.W.3, are the UK agents for Badische Maschinenfabrik A.G. of Durlach and have issued recently two catalogues covering moulding machines. In the first, a 12-page publication, four types of machines are dealt with, having lifting capacities from one to 44 tons. They include shockless jolters, jolt/turnover and jolt/draw machines, one illustration of the former type showing a unit engaged in ingot-mould production. The second catalogue, in four pages, covers the firm's fully-automatic jolt/squeeze/draw machine. For this, details of special features are quoted and illustrated, and in Figs. 5 and 6 two layouts are shown of the unit mated with ancillary plant.

Ductile Iron Pipes. The Société des Fonderies de Pont á Mousson, 91, Avenue de la Libération, Nancy, France, has issued a 16-page well-illustrated brochure, printed in English, which details the methods of production of ductile (nodular-iron) pipes, from the tapping of blast-furnace metal to the shipping of the completed article. Thereafter the properties of standard manufactured pipes are set out, embellished with illustrations of the appropriate testing methods. An impressive picture is included in the brochure of a tanker carrying lines of cast-iron pipe—a useful extension of the use of iron castings. A second catalogue, "Ductile Iron," also printed in English, extends the subject to pipe-fittings, valves and accessories.

Lighting Fitting. In technical *Bulletin* No. 39, Victor Products (Wallsend), Limited, make out quite a good case for the substitution of fluorescent lighting in place of incandescent bulbs, especially when the problem is the illumination of dark corridors. It is claimed that the miniature bulkhead variety described will work continuously for 12,000 hours or with one switch on per day for 8,000 hours.

Tooling Aids. Woodside Die Sinking Company, Limited, Aire Vale Works, Newlay, Leeds 13, have issued a four-page leaflet which illustrates and describes a number of examples of jigs and fixtures which they make and stock.

Control Gear for Machine-tools. In Publication No. 1746/1, Allen West and Company, Limited, Brighton 7, illustrate and describe a large number of control mechanisms they have designed for well-known makes of machine-tools.

MI Chairman's Report

Recalling that at the time of the last annual meeting the group was made up of 16 active subsidiaries with a total of 6,000 employees, Sir Charles Westlake, chairman of Metal Industries, Limited, states that today the group has 38 subsidiaries and associated companies at home and overseas, and the number of employees exceeds 12,000. "The market value of our issued share capital has increased from about £10,000,000 to a figure in excess of £26,000,000. The number of our ordinary stockholders has risen from a little over 7,000 a year ago to approaching 10,000."

Sir Charles says the acquisition of the Lancashire Dynamo group and the consequent doubling in size of the Metal Industries group made 1959-60 a momentous year. Integration of the two groups would take some time, but the problems were being resolutely tackled.

A substantial programme of capital expenditure is now under way, not only in replacements to increase efficiency in production, but also in the expansion of activities, particularly in newer fields of development. Apart from progress in the electrical and hydraulic fields, the general engineering, metal processing and shipbreaking activities "continue to give us the useful financial support we have come to expect of them."

Machine-tool Industry's need for Stability

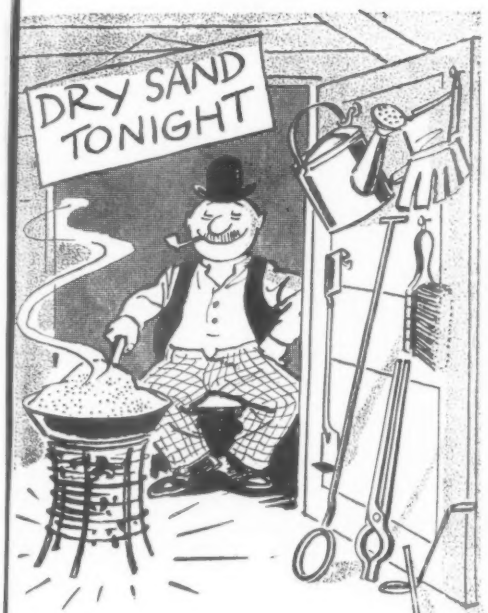
Full employment, substantially reduced night-shift working, a shorter working week, wage increases, and general inflationary pressures have the effect of increasing demand for high-production, fully-automated machine tools. Lord Aberconway, chairman of Wickman, Limited, the Coventry machine-tool manufacturers in his annual review goes on to say that the extent to which the group will be able to take advantage of these circumstances will depend on its ability to obtain additional craftsmen and technicians.

He points out that the industry is one of "feast and famine" and that skilled craftsmen taken on during the industry's "ups" are sometimes made redundant during its "downs" with resulting bad labour-relations. If the machine-tool industry is to achieve stability, hold the necessary craftsmen and technicians, and maintain and improve its service to the motor-vehicle industry, Lord Aberconway believes that "it is essential to achieve closer co-operation between the two industries in forecasting the need for new capacity before it arises."

Employers dissatisfied with Standard of Recruits

Support for the raising of the school-leaving age to 16 because of "the widespread dissatisfaction throughout industry at the standards of education of large numbers of boys and girls entering industry at the present time, particularly in elementary English and mathematics," is expressed by the British Employers' Confederation in a document recently issued.

The Confederation considers that the advantage to industry of better educated recruits which would result from an additional year of full-time education would outweigh any disadvantages. The document consists of comments on the Crowther Report on the development of education for young people aged 15 to 18, and has been sent to the Ministry of Education



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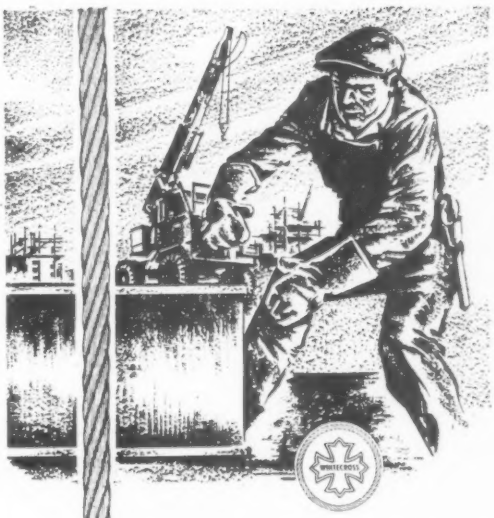

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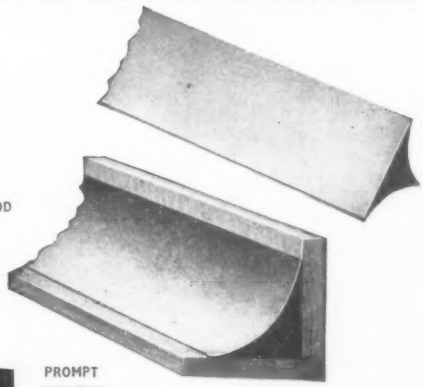

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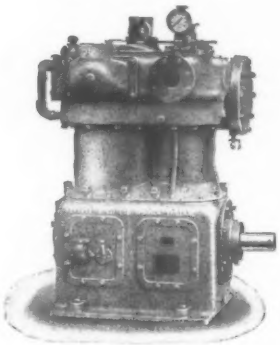

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Bilston Stove & Steel Truck Co., Ltd.	39
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British Aero Components Ld.	—
British Electrical Repairs, Ltd.	—
British Foundry Units, Ltd.	14
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British Mono Rail, Ltd.	—
British Moulding Machine Co., Ltd.	1
British Oxygen Co., Ltd.	—
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Broom & Wade, Ltd.	—
Buckland Sand & Silica Co., Ltd.	—
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Carborundum Co., Ltd.	—
Catalin, Ltd.	—
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Centrozap Foundry Machines	—
Chemicals & Feeds, Ltd.	—
Chetham Timber Co., Ltd.	—
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City Casting & Metal Co. Ltd.	16
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Coleman-Wallwork Co., Ltd.	7
Combustion Chemicals, Ltd.	—
Consolidated Pneumatic Tool Co., Ltd.	—
Constructional Engineering Co., Ltd., The	28
Cont rolled Heat & Air, Ltd.	—
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Cox & Danks, Ltd.	—
Crockett Lowe, Ltd.	—
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Cumming, Wm., & Co., Ltd.	12 & 13
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Durrans, James, & Sons, Ltd.	8
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Evans, Roy, M.I.B.F.	—
Evans, Stanley N., Ltd.	—
Eyre Smelting Co., Ltd.	—
F. & M. Supplies, Ltd.	247
Felco Hoists, Ltd.	—
Fischer, George, Ltd.	—
Fisher-Foundries, Ltd.	—
Fletcher Miller, Ltd.	16
Flextol Engineering Co.,Ltd.	5
Floodgate Steel Fabricating Co., Ltd.	—
Fordath Engineering Co., Ltd.	2
Foundry Equipment, Ltd.	10 & 11
Foundry Mechanisations (Baillot), Ltd.	6
Foundry & Metallurgical Equipment Co., Ltd.	—
Foundry Plant & Machinery, Ltd.	23
Foundry Services, Ltd.	9
Foundry Suppliers, Ltd.	—
Foxboro-Yoxall, Ltd.	—
Franklin Furnaces, Ltd.	17
Fuel & Metallurgical Processes, Ltd.	—
Fullers' Earth Union, Ltd., The	43
G.W.B. Furnaces, Ltd.	—
Gadd, Thos.	—
Gas Council	—
General Refractories, Ltd.	29
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Gliksten, J. & Son, Ltd.	—
Goodyear Tyre & Rubber Co., Ltd.	253
Green, E., & Son, Ltd.	—
Green, Geo., & Co.	19
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Griffiths, A. E. (Smethwick), Ltd.	—
Guest, Keen Iron & Steel Co., Ltd.	25
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Hills (West Bromwich), Ltd.	15
Holman Bros., Ltd.	—
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Impregnated Diamond Products, Ltd.	—
Incandescent Heat Co., Ltd.	26 & 27
Ingersoll-Rand Co., Ltd.	—
Jackman, J. W., & Co., Ltd.	—
Jacks, Wm., & Co., Ltd.	251
Joy-Sullivan, Ltd.	—
Keith-Blackman, Ltd.	—
Kenilworth Mfg. Co., Ltd.	4
King, Geo. W., Ltd.	—
Lafarge Aluminous Cement Co., Ltd.	255
Laidlaw, Drew & Co., Ltd.	—
Lazarus, Leopold, Ltd.	—
Leicester Lovell & Co., Ltd.	—
Levy, B., & Co. (Patterns), Ltd.	38
L.M.S. Products, Ltd.	—
Lones, Joseph Laboratories	—
Lord, E. S., Ltd.	—
Luke & Spencer, Ltd.	24
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Patterncrafts, Ltd.	—
Pearson, E. J. & J., Ltd.	18
Peco Machinery Sales, Ltd.	—
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